



Warm water fish like this bluegill are among the aquatic invasive species changing Tahoe's environment. See timeline on pages 14-15.

TAHOE IN DEPTH

Protecting, Enjoying & Exploring the Lake Tahoe Basin Summer 2018 ■ Issue #13

AQUATIC INVADERS

SPECIAL REPORT

10 Years Fighting Aquatic Invasive Species

Photo: Dylan Silver, tahoeclarity.com

PRSR STD
U.S. POSTAGE
PAID
RENO, NV
PERMIT #765

Tahoe In Depth
PO Box 5310
Stateline, NV 89449

INSIDE THIS ISSUE:

- **INSPECTIONS:** For 10 years, inspections have helped prevent new invasions.....4
- **MARINAS:** Employees play a key prevention role5
- **INNOVATION:** TRPA working with boat builders on solutions 6
- **PRIVATE HELP:** The Tahoe Fund focusing on invasive species..... 7
- **RESEARCH:** Scientists launch pilot project to remove tiny shrimp..... 8
- **WEEDS:** Tahoe RCD hoping to replicate eradication success 9
- **THE KEYS:** Tahoe Keys is battling invaders on several fronts.....10
- **THE FUTURE:** Intensive monitoring needed to prevent a return.....11



Invasive species fight hits 10-year milestone

Trying to protect a place as incredibly beautiful as Lake Tahoe is a special privilege and a weighty responsibility. And carrying out this mission while maintaining a healthy recreation-based economy is exceedingly challenging. Ten years ago when a small invasive mussel showed up in Southern Nevada’s Lake Mead, all eyes turned to Tahoe with great alarm. How on earth would we ever keep these out of our pristine lake?



The quagga mussel, a cousin to the zebra mussel that destroyed ecosystems, beaches, and infrastructure from the Great Lakes to the eastern seaboard, was close. A battle was on our doorstep and something bold had to be done.

TRPA is proud to have pulled together a vast partnership of 40 different organizations in both the public and private sectors to tackle this enormous challenge. Now, 10 years later, we’ve hit a milestone of detecting no new invasive species in Lake Tahoe. While many said it was an impossible task, we were confident that our track record of epic collaboration would serve us well. And now our program is held up as a national model.

But the battle is far from over. Warming air and water temperatures are making the high-alpine cold waters of the lake more vulnerable to warm water fish, aquatic invasive plants, and other invaders like quagga mussels. This issue of *Tahoe In Depth* contains special coverage of the fight against aquatic invasive species. We hope you find it useful and informative.

Enjoy the lovely Tahoe summer!

— Julie Regan
executive editor

Tahoe In Depth

Publisher and contributors: The Tahoe Regional Planning Agency publishes Tahoe In Depth in partnership with various state and federal agencies. Contributors include the California Tahoe Conservancy, U.S. EPA, U.S. Fish & Wildlife Service, U.S. Forest Service, Incline Village General Improvement District, Lahontan Regional Water Quality Control Board, League to Save Lake Tahoe, Nevada Department of Wildlife, Nevada Division of Environmental Protection, Nevada Division of State Lands, Nevada Division of State Parks, Tahoe City Public Utility District, South Tahoe Refuse, Tahoe Fund, Tahoe Resource Conservation District, Tahoe Transportation District, Tahoe Water Suppliers Association, University of California, Davis, University of Nevada, Reno, Desert Research Institute, and the Washoe Tribe.

Executive Editor: Julie Regan

Managing Editor: Sarah Underhill

Design/Copy Editor: Jim Sloan

Contributors: Amy Berry, Morgan Beryl, Brenna Blessing, Megan Dee, Meredith Gosejohan, Adam Jensen, McAvoy Lane, Tom Lotshaw, Jesse Patterson, Christina Restaino, Will Richardson, Brita Romans, Jaclyn Tain, Dennis Zabaglio

Copyright 2018 © – All rights reserved.

Major funding provided by:



CONTENTS

13



Johnson Meadow

The largest privately owned section of the Upper Truckee River has been acquired by the Tahoe Resource Conservation District and will be the catalyst for several restoration projects designed to decrease the amount of fine sediment affecting Lake Tahoe’s clarity.

16

Going outside to heal

Barton Health and the U.S. Forest Service are working together to improve community health through a program called “Wellness Outings”—guided walks in the national forest that promote nature as a medicine that helps patients heal.



17

Shoreline plan

TRPA and nearly a dozen partner agencies and groups have been working together as the Shoreline Steering and Joint Fact-Finding Committees to create a plan for piers, buoys, boat ramps, and marinas—the shoreline structures people use to access Tahoe.



20



Road construction

It wouldn’t be summer without some road construction. But the projects slowing down traffic this summer will help relieve congestion in the long run as crews improve roads and bike trails that will make getting around the basin much easier.

21

What’s in a name?

From “Da ow aga” to “Mountain Lake,” Tahoe has had several names over the years. McAvoy Lane recounts many of the names and how they came to be.

28

It’s a ‘Big Year’

This is the year that basin birdwatchers break out the binoculars and attempt to identify as many bird species as possible.



10 years of success battling invasive species

Tahoe created a world-class model for protecting the lake from weeds, fish, and other intruders

By Jim Sloan

TAHOE IN DEPTH

Nicole Cartwright remembers her first summer at Lake Tahoe. It was 2007, and she was working on a pilot project introducing boat inspections at launch sites around the Lake Tahoe Basin.

At the time, natural resource managers throughout California and other parts of the country were scrambling to find ways to battle tenacious aquatic invasive species that were invading lakes and rivers, fouling boat propellers, ruining swimming areas, and clogging domestic water systems. Many lakes around the country had been ecologically decimated by such foreign invaders as quagga mussels, curlyleaf pondweed, and invasive fish.

Although Cartwright had studied the problems posed by invasive species, that summer she was learning how to explain to the public how aquatic invasive plants posed a threat to Tahoe.

"It was so eye-opening for me," she said. "People were accustomed to having open access to the lake and now we were explaining why we needed to inspect their boats."

Dennis Zabaglo, the aquatic resources program manager at Tahoe Regional Planning Agency, remembers the summer of 2007 well. That was when invasive mussels were discovered in Lake Mead. Resource managers in the West had been working for years to halt the spread of invasive mussels from the Great Lakes—calling their work the 100th Meridian Initiative—and the discovery of mussels in Mead was a chilling confirmation that the mussel had slipped past them.

"That's what really drove us to action," he said. "Quagga and zebra mussels can have a tremendous impact on a lake. They reproduce quickly, clogging dams and water conveyances, and they completely disrupt the food chain. They excrete nutrients that cause algal blooms, and they consume the phytoplankton that native fish rely on."

With the mussels already established in Lake Mead, Tahoe faced a daunting challenge. Adult mussels cling tenaciously to boats and are difficult to remove. In their juvenile stages, the mussels are microscopic and easily transported in small amounts of water in



Photo: Novus Select

An inspector checks a boat for aquatic invasive species prior to launch.

boat compartments.

The boat inspection program was launched in 2008 and was voluntary. The next year it became mandatory.

Today, it's the most comprehensive program in the country. Resource managers from all over the world call TRPA or the Tahoe Resource Conservation District for advice. More than 70,000 boat inspections have been conducted and more than 32,000 boats have been decontaminated at Tahoe. Inspectors have flagged hundreds of watercraft infested with mussels and other invasives and decontaminated them before the boats were launched. Meanwhile, in other areas of the West, the mussels spread to more than 60 other waterbodies.

"If we hadn't started inspections when we did, it's very likely Tahoe would be home to mussels today," Zabaglo said.

10 years of success

A decade after the program launched, Cartwright, now the executive director of the Tahoe Resource Conservation District (Tahoe RCD), has noticed the public's understanding of the threat from aquatic



Photo: Novus Select

An inspector peers into the hull of a kayak. Hand-carried watercraft, such as kayaks and paddleboards, are screened at developed recreation sites. Inspections and decontaminations for canoes, kayaks, and paddleboards are free for paddlers who have recently visited infected waters. Visit TahoeKeepers.org to learn how to self-inspect and decontaminate your gear

invasive species has increased.

"People understand about aquatic invasive species now," Cartwright said. "When we go into the schools and businesses, people understand the

importance of aquatic invasive species prevention and also why we work to control them. When boaters come

Continued on page 24

Boat inspections critical in fight

Mussels triggered prevention program that has intercepted thousands of contaminated watercraft

By Brita Romans and Tom Lotshaw
TAHOE REGIONAL PLANNING AGENCY

An ounce of prevention is worth a pound of cure, as the saying goes. And watercraft inspectors are Lake Tahoe's frontline defense to prevent new introductions of aquatic invasive species that would cost tens of millions of dollars to manage or eradicate—if they could be managed or eradicated at all.

This summer marks the 10th anniversary of Lake Tahoe's watercraft inspection program. In that time, the program has grown into a national model for invasive species prevention and the boat inspectors have successfully prevented any new introductions of aquatic invasive species.

"This major milestone highlights the importance and success of this critical program," said Chris Kilian, who became a watercraft inspector 10 years ago and now manages the program for the Tahoe Resource Conservation District.

Kilian and his team of trained, certified watercraft inspectors work to check every motorized boat and jet ski for aquatic invasive species before launching in Lake Tahoe's famously clear, blue water—protecting the lake's environment, economy, and recreational opportunities.

The inspection program was launched when highly invasive quagga and zebra mussels were being spread west from the eastern United States and Great Lakes, hitching rides on boats, trailers, and other fishing and water recreation equipment. Quagga mussels reached Lake Mead in southern Nevada in 2007, where they now number in the trillions.

Forty partner agencies, non-profit groups, and private organizations working together as the Lake Tahoe Aquatic Invasive Species Program launched a voluntary watercraft inspection program in 2008 and inspections became mandatory in 2009.

The invasive mussels have been impossible to control or eradicate once introduced and have wreaked havoc on every waterbody they have reached in America. They are easily spread, attaching to nearly any surface, and once introduced to a new lake or river, they can reproduce at an alarming rate. One adult quagga can produce up to a million offspring each year.

"The mussel larvae, called veligers, are



Photo: Novus Select

An inspector decontaminates a boat prior to its launch.

about 20 microns in size. You can't see them with the naked eye, so the "Clean, Drain, Dry" system greatly reduces the risk of bringing any new invasive species to Tahoe," Kilian said.

The program quickly caught boats carrying the invasive mussels. Inspectors regularly intercept boats carrying invasive species, but more boaters are showing up to Tahoe with their watercraft clean, drained, and dry.

Tahoe's watercraft inspection program shows how local, state, and federal agencies and private organizations can partner to protect lakes and rivers from new invasive species introductions.

In the beginning of the program, watercraft inspectors traveled around the basin to boat ramps and marinas to inspect and decontaminate boats before they launched. The inspectors now operate out of four stations around the Tahoe area during the peak boating season from May through September. They examine every motorized boat, jet ski, and trailer, looking for signs of mud, debris, or water carrying invasive species.

Boats found to be clean, drained, and dry are affixed with a wire seal that allows them to launch at marinas and boat ramps.

Boats that do not arrive at the inspection station clean, drained, and dry must be decontaminated to kill any possible invasive species before they are allowed to launch.

Boaters who enjoy wakeboarding are encouraged to fill and empty their ballast tanks in the same place to help prevent the spread of species that have already taken hold in the lake, such as Eurasian watermilfoil and Asian clams.

Funding for the watercraft inspection program comes from boater inspection and decontamination fees, which cover about half of the program's costs. The other half is funded by the states of California and Nevada, and the federal government.

"We couldn't have started this nationally recognized program without the support of our congressional delegation and the federal government," said Julie Regan, TRPA's chief of external affairs. "Now the states of California and Nevada sustain the public funding that makes the program possible. It's the public-private partnership that's so strong."

Brita Romans is a recent graduate of the University of Nevada, Reno and an intern at TRPA. Tom Lotshaw is the public information officer at TRPA.

Save time and money on your boat inspection:

Clean contaminants, plant, and animal matter off your prop, trailer, anchor, fishing or dive gear, bilge, storage compartments, and live wells.

Drain water from your intakes and sea strainers, ballast tanks, live well, bilge, and storage compartments.

Dry bumpers, ropes, anchor, and equipment.

Watercraft inspection stations

Tahoe-Truckee Inspection Station: On Chandelle Way, off state Route 267 and Truckee Airport Road (on northwest edge of airport tarmac).

Alpine Meadows Ski Resort: Off state Route 89 on Alpine Meadows Road in the Deer Park parking lot.

Spooner Summit: State Route 28 in the Snow Park area near the intersection with U.S. Highway 50.

Meysers Inspection Station: 2175 Keetak Street, near the intersection of state Route 89 and U.S. Highway 50.

Learn more: TahoeBoatInspections.com.

Tahoe marinas tackling invasive weeds

Boatyard workers are important ‘Eyes on the Lake’ participants

Jesse Patterson

LEAGUE TO SAVE LAKE TAHOE

In many ways, staff at Lake Tahoe’s marinas are the last line of defense for preventing the spread of aquatic invasive species. Much like Tahoe’s boat inspection program, marina staff are often the final pair of trained eyes on a boat before it enters the lake.

While Tahoe’s boat inspection program has been an overwhelming success at preventing the introduction of new invasives, dozens of non-native species are already established and spreading in the lake. Many invasive species are easily spread by unsuspecting boaters if their trip starts from or involves a stop in any of the infested areas around the lake. Fortunately, marina managers and staff are taking steps to be part of the solution.

Starting in 2015, staff from Tahoe marinas began participating in aquatic invasive species trainings delivered by experts with the League to Save Lake Tahoe’s Eyes on the Lake program.

Eyes on the Lake was started as a citizen science monitoring program designed to help prevent the spread of aquatic invasive species in Tahoe’s waters. League scientists and engagement staff have trained nearly 500 community members on how to identify and report the presence of aquatic plants found while out enjoying the lake.

“It’s our role to prevent the spread because we’re a big entry point,” said Darren Kramer, general manager at Obexer’s Boat Company. “Education is key. If you’re not aware of something affecting the lake, you’re not able to help change it. We have a role in mitigation, where we can report what we find. If we have questions, it’s our job to find the professionals to help with identification to make sure things don’t get worse.”

Employees from every Tahoe marina have participated in training tailored to the special concerns. In addition to concerns of plant fragments arriving attached to boats, marinas are usually at high risk for aquatic invasive species infestations, given their warm, calm waters and the available nutrient inputs from stormwater runoff.

“Marina staff are the boots on the ground when it comes to addressing aquatic invasive plants, since they are at the water’s edge and able to observe

day-to-day changes. It’s important to give them the resources we can—Eyes on the Lake training—so they are aware, and can respond to the problem of invasives increasing and spreading in the lake,” said Mary Fiore-Wagner with Lahontan Regional Water Control Board.

As part of the update of the general permit that addresses marina operations under the National Pollutant Discharge Elimination System, marinas now have guidelines for how to deal with boats that arrive with invasive plants attached, including a set of questions for boaters to help identify the source of the plant. Marinas now also survey their own areas. If an infestation exists, they map the infestation locations to prevent further spread.

“It’s also good that marinas implement the best management practices identified in their marina pollution-prevention plans,” Fiore-Wagner said. “Best management practices that marinas should implement to control the spread of invasives plants include: skimming for plant fragments, having boaters back up before leaving the marina to dislodge the plants, and educating boaters.”

The Eyes on the Lake training provided to marina staff includes opportunities to handle samples of the two aquatic invasive plants that are already present in Lake Tahoe—Eurasian watermilfoil and curlyleaf pondweed—alongside samples of the native look-alike plants that are commonly found in the same areas.

“The biggest benefit for us has been seeing and touching the live plants,” said Kramer.

“Seeing a picture in a slideshow is one thing, but being able to pick up and touch the plants in the Eyes on the Lake training was very educational.”

When a marina staff member—or any other Eyes on the Lake-trained community member—reports finding a new aquatic invasive plant or other invasive species, it triggers a rapid response that kicks into gear over 40 partner agencies of the Lake Tahoe Aquatic Invasive Species Program.

“Aquatic invasive species could ruin the entire ecology and biology of the lake,” said Kramer. “It would change everything about Lake Tahoe.”

Jesse Patterson is deputy director of the League to Save Lake Tahoe.



“It’s our role to prevent the spread (of invasives) because we’re a big entry point. Education is key—if you’re not aware of something affecting the lake, you’re not able to help change it.”

Darren Kramer

Obexer’s Boat Company

TRPA, boat builders collaborate on new designs

New filters, clam harvester among many innovations aimed at controlling invasive species

By Dennis Zabaglo

TAHOE REGIONAL PLANNING AGENCY

Ten years ago, when a new threat to Lake Tahoe from invasive species emerged, TRPA stepped up to tackle the challenge.

That challenge, now known throughout the West, was to prevent the spread of aquatic invasive species, especially quagga mussels. TRPA took the initiative to lead the collaborative partnership to fight invasive species, which is now a national model of success.

Beyond local partnerships, TRPA has expanded relationships at the national level, seeking new methods to prevent a quagga mussel introduction and to prevent and control other species.

TRPA works with the boat industry to develop new components and encourage new thinking when it comes to designing and building boats. For instance, Wake Worx, LLC of Florida has developed a filter in collaboration with TRPA, University of Nevada, Reno, and others. The filter is designed to prevent quagga mussel juveniles and other species from entering ballast tanks on wakeboard boats. Due to the large amount of water that these tanks can hold, invasives could easily be transported to another waterbody. This innovative filter significantly reduces the risk of transport.

Also helping to prevent the spread is Volvo Penta, which manufactures boat engines. Starting with model year 2017, stern-drive engines come outfitted with a hose quick-connect designed to simplify and increase effectiveness of hot water decontaminations. The boat industry is embracing work to combat invasives and is committed to partnering with TRPA and others to find new solutions.

To help control invasive species already in the lake, a new technique is in the testing phase. Inventive Resources, Inc. from the Central Valley of California, has invented a method using ultraviolet light to help control aquatic invasive plants. "When I hear 'it will never work,' it kicks me into high gear, and makes me even more passionate about using innovation to solve problems. *Everything* can be improved upon," said John Paoluccio, owner of Inventive Resources, Inc. The project, overseen by the Tahoe Resource Conservation District, is showing promising initial results, and the



Photo: Inventive Resources, Inc.

A boat equipped with UV lights is used to kill aquatic invasive plants.

"When I hear 'it will never work,' it kicks me into high gear, and makes me even more passionate about using innovation to solve problems. Everything can be improved upon."

John Paoluccio, *Inventive Resources, Inc.*

partnership is eager to continue the pilot project with post-monitoring in 2018.

Another new method, called laminar flow aeration, will be tested at two locations with the most dense and complicated aquatic invasive plant infestations at the lake—Ski Run Marina and the Tahoe Keys. Laminar flow aeration injects millions of tiny air bubbles from the bottom to the lake surface, producing constant, parallel layers of flow, with no cloudiness between the layers. The resulting oxygen-rich environment enhances the consumption of the organic layer at the

bottom, which plants use for food. If there is less food, then it becomes less likely the plants will survive.

Plants are not the only invasives needing to be controlled. The invasive Asian clam is also a problem at Lake Tahoe. Rubber barriers can kill these unwanted creatures, but the process leaves behind dead shells that are a nuisance. The decomposing shells are visually unappealing and may also add concentrated levels of calcium that make areas of the lake more suitable for other potential invaders like quagga mussels. Here too the private sector is

seeking solutions. Aqua Treasures, LLC of Canada has developed equipment that will harvest the clams from the lake bed. Additional development on this invention is still needed, but plans are in the works to test the equipment this fall at Lake Tahoe.

As the adage goes, "you can't build a house with a hammer alone," but with continued investment in innovation, the Lake Tahoe Aquatic Invasive Species Program will have the tools to continue the success of the past 10 years.

Dennis Zabaglo is TRPA's aquatic resources program manager.

Community plays key role in defeating invaders

Tahoe Fund active in raising money for better controls and innovative solutions

By Amy Berry

TAHOE FUND

Imagine it is a hot summer day and you are standing on the shoreline of Lake Tahoe with plans to cool off in the clear blue waters. But instead of crystal clear waters, you see a field of slimy weeds. Unfortunately, this is a reality now.

"The impact of aquatic invasive species is really changing the shorelines," said Katy Simon Holland, Tahoe Fund board chair. "As a nonprofit that is charged with working with the private community to improve the lake, this is one of our most important areas of focus."

The Tahoe Fund has played a critical role in supporting projects to control and remove aquatic invasive species. Starting in 2014, the organization raised \$50,000 to support an Asian clam project at the mouth of Emerald Bay. The next year, more than \$60,000 was raised to treat aquatic invasive weeds from the mouth of the Tahoe City Dam and the Ski Run Channel. Also in 2015, the Tahoe Fund worked with a corporate donor, Ritz-Carlton, Lake Tahoe, to help fund a watercraft inspection station.

In addition, the organization recently completed a matching campaign to purchase the full inventory of bottom barriers to continue to treat weeds around the lake. Thanks in large part to donations from Tahoe Blue Vodka and the Tahoe Truckee Community Foundation's Queen of Hearts, the Tahoe Fund raised \$26,000 to match a grant from the Tahoe Water Suppliers Association totaling \$52,000. "More mats means fewer weeds and a clearer lake," Queen of Hearts representative Nancy Gisko said when asked why they supported the project.

"Aquatic invasive species are a big threat to Lake Tahoe, so everybody should be taking it seriously," said Madonna Dunbar, executive director of the Tahoe Water Suppliers Association. "Because Tahoe has some of the best drinking water in the world, we wanted to support ongoing field work using nonchemical control methods."

Building on the success of these projects, the Tahoe Fund was approached by John Paoluccio, an inventor and Tahoe homeowner, with the idea of using UV light to control aquatic invasive weeds. UV light has long been used to disinfect

"We jumped at the chance to try something new and innovative. If this solution works, it will transform how we treat invasive plants in Tahoe."

Kevin Marshall, Tahoe Fund

water facilities, but it had never been used to kill Eurasian watermilfoil or curlyleaf pondweed.

"We are looking for new ideas and solutions to the challenges facing the lake," said Kevin Marshall, Tahoe Fund board member and member of the Tahoe Fund's Environmental Venture Trust Committee. "We jumped at the chance to try something new and innovative. If this solution works, it will transform how we treat invasive plants in Tahoe."

The Tahoe Fund worked with the Tahoe Resource Conservation District to turn this idea into a pilot project last summer. The nonprofit provided the early stage funding to cover permitting fees so the Tahoe RCD could secure a \$260,000 grant from the California Tahoe Conservancy for the project. The pilot project hit the water last summer and the early results were encouraging. Monitoring will continue this summer, with a final report due in early 2019.

"We will continue to focus on a mix of proven and innovation solutions," Marshall said. "We want to support what works."

"Invasive species have far-reaching consequences, from jeopardizing our water supplies to degrading the pristine natural beauty of our lake," Simon Holland said. "So we are extremely grateful to the many private individuals and organizations that are helping us to succeed in combating this environmental threat."

To learn how you can support projects to rid the lake of aquatic invasive species, visit www.tahoe fund.org.

Amy Berry is the executive director of the Tahoe Fund.



Photo: U.C. Davis

A diver inspects bottom barriers used to kill Asian clams. The Tahoe Fund has leveraged public investments by raising private money to purchase bottom barriers for treating aquatic invasive species.

Project aims to reduce Mysis shrimp numbers

Controlling this invader could boost water clarity and help protect lake's ecology

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

A University of California, Davis research team led by civil and environmental engineering professors Geoff Schladow and Alex Forrest, along with environmental science and policy professor Steve Sadro, is working on a pilot project to test and optimize a strategy to reduce Mysis shrimp populations in Emerald Bay and Lake Tahoe.

Working with the U.C. Davis Tahoe Environmental Research Center, the team aims to reduce the abundance of Mysis shrimp, one of Tahoe's most ubiquitous invasive species, to levels where they no longer impact the ecosystem of the lake.

Mysis shrimp were deliberately introduced into Tahoe in the 1960s to provide a food source for lake trout and kokanee salmon, popular sport fish that had also been introduced.

"The Lake Tahoe ecosystem has changed dramatically in the last 50 years, and the importance of restoring ecological function of the lake's native species in place of the invasive Mysis shrimp cannot be overstated," Schladow



Photo: Robin Li, Seamor Marine Ltd.

Mysis shrimp were introduced to Lake Tahoe in the 1960s.

said. "Our findings in Emerald Bay will be critical in developing a plan and strategy for Lake Tahoe."

If the number of Mysis shrimp can be reduced, native zooplankton species like daphnia, which play a critical role in eating other, smaller native zooplankton species

that can reduce lake clarity, will be able to recover to levels not seen since Mysis shrimp were established in the lake. That could lead to a significant improvement in water clarity—one of the long-term restoration goals for Lake Tahoe.

The research team is using real-time,

remote sensing technologies to locate high-density patches of Mysis shrimp and map out the natural variability in the distribution and migration of these organisms throughout Emerald Bay. If successful, the technology and tools developed through this pilot project will be used to provide guidance for harvesting Mysis shrimp in the rest of the lake.

The use of underwater remote sensing draws on Forrest's research experience with autonomous underwater vehicles as data collection platforms. If this pilot project is successful, the team will use similar platforms in the future in other parts of Lake Tahoe that can't be surveyed using boat-based techniques.

"Applying emerging technologies and untethered, autonomous robotics enables an understanding of aquatic habitat and ecosystem assessment not available today," Forrest said.

The California Tahoe Conservancy contributed \$390,000 in Prop 1 funding and Nevada Division of State Lands provided \$60,000 in federal funds through the Clean Water Act for this project.

New website helps Tahoe ecotourists

More than 20 groups join forces on tool to make it easy to learn about environmental activities

It only takes one click to get closer to helping Lake Tahoe thanks to more than 20 environmental organizations.

Take Care Tahoe is a group of organizations that love Lake Tahoe and want to make it easier for people to participate and learn more about it. The group launched takecaretahoe.org—a single information source for all environmental education activities. The new site was made possible by a grant from AT&T.

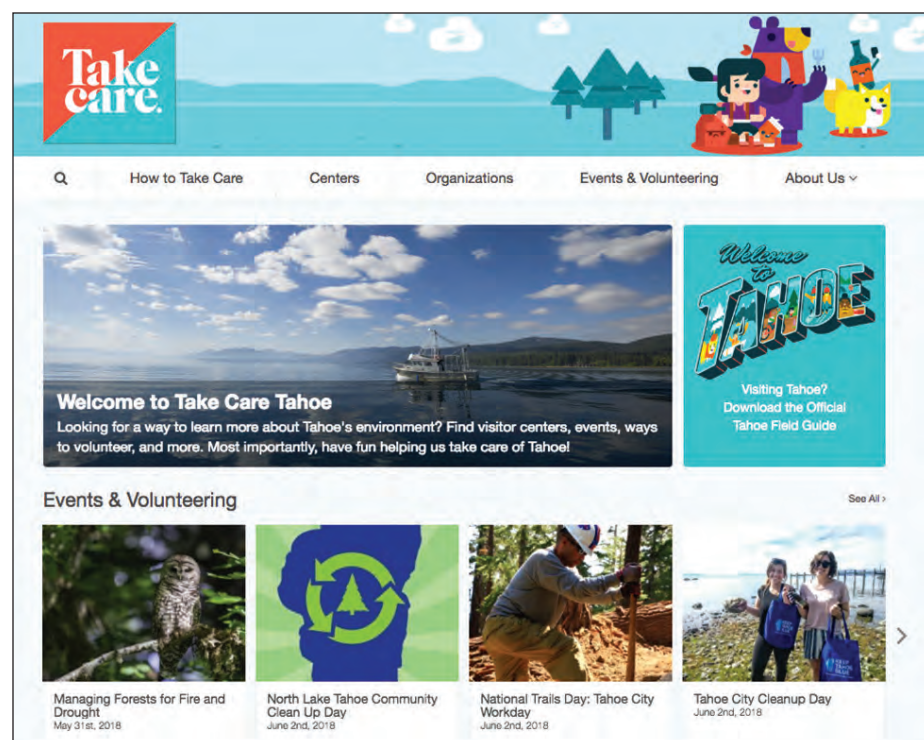
"We're excited to see the launch of this great new tool for people looking to get involved in taking care of Lake Tahoe," said Marilee Movius, community engagement manager for the League to Save Lake Tahoe and a member of the Take Care Tahoe team.

Beach cleanups, wildflower hikes, insightful discussions, and environmentally friendly festivals are just a few of the opportunities people can

find on the new site. Timely information on all the latest environmental events and volunteer opportunities around the lake is available, with a search feature that allows people to find activities during specific timeframes. With a few clicks, people can also discover information on where they can learn more about the science, history, and environment of Tahoe.

"There are so many wonderful ways for visitors and residents to connect with Tahoe, but it hasn't always been easy to find these opportunities in the past," said Amy Berry, CEO of Tahoe Fund and a member of the Take Care Tahoe team. "We developed this site to make it easier for people to participate in taking care of Tahoe."

For more information and a list of all contributors to the site, visit takecaretahoe.org.



Partners look to replicate weed-control success

With Emerald Bay cleaned up, attention turns to other infestations

By Brenna Blessing

TAHOE RESOURCE CONSERVATION DISTRICT

Eurasian watermilfoil and curlyleaf pondweed are two of the most widespread and problematic aquatic invasive species in Lake Tahoe.

The weeds grow aggressively and are easily spread, producing fragments and clones that can float, sprout roots, lie dormant through winter, and start new satellite populations. But their populations can be controlled, and more than 40 public, private, and nonprofit partners in the Lake Tahoe Aquatic Invasive Species Program are working to do just that.

One example of that work is Emerald Bay, where several Eurasian watermilfoil plants were first observed in 2000. By 2003, the plants had infested nearly an acre of the bay, choking out the clear water and sandy beaches at one of Tahoe's most iconic and heavily visited locations.

The aquatic invasive species partnership assessed the Emerald Bay infestation and started testing various control methods using combinations of bottom barrier mats to deprive the plants of sunlight and diver-assisted suction removal. Action became imperative as the invasive plants continued to spread, covering 3 acres of the bay's shoreline by 2008 and 6 acres by 2010.

Partners joined forces for an extensive, multiple-year project to control the infestation starting in 2010. The weeds were successfully eliminated in Emerald Bay over several years and the bay remains weed-free nearly five years later.

Partners are now working to replicate that success around the lake, following a three- to five-year control strategy provided by an aquatic invasive species implementation plan prepared by researchers at the University of Nevada, Reno.

"The plan uses an ecological and science-based framework to prioritize sites for treatment and calls for controlling satellite populations to achieve containment," said Nicole Cartwright, executive director of the Tahoe Resource Conservation District.

Since 2005, partners in the Lake Tahoe Aquatic Invasive Species Program have implemented control projects and removed more than 32,000 gallons of



Photo: Monique Rydel, © Marine Taxonomic Services, Ltd.

A diver suctions up Eurasian watermilfoil from the bottom of Lake Tahoe.

aquatic invasive plant biomass from the lake and its tributaries.

Bottom barriers have been used to treat over 520,000 square feet of the lake and over 770,000 square feet of infestations have been treated with diver-assisted suction removal. Through 2017, approximately 36 acres of Lake Tahoe and the Truckee River have been treated and inventoried by program partners.

With Lake Tahoe's boat inspection program successfully preventing new introductions of aquatic invasive species, partners are working to ramp up these types of control projects to better manage, if not eradicate, harmful invasive species like Eurasian watermilfoil and curlyleaf pondweed to keep them from spreading.

This work will continue for years to come, as continuing experiments with new treatment methods are tested, such as ultraviolet light, which has proven in lab studies and small field tests to

damage the DNA and cellular structure of aquatic plants. Tahoe Resource Conservation District is working with partners on post-treatment monitoring to determine how effective an ultraviolet light pilot project was at Lakeside Beach and Marina with plans to release the final results in early 2019.

Other projects to treat and monitor these aquatic invasive plants in 2018 include surveillance monitoring in Fleur du Lac and Tahoe Vista, with the potential for a second round of treatment if needed; treatment in the Truckee River reaching downstream; post-treatment monitoring at Crystal Shores; and treatment at Elk Point Marina, where the Elk Point Country Club Homeowner's Association is working with Nevada Division of State Lands and contributing a quarter of the project's cost.

Lake Tahoe's aquatic invasive species

control program is also seeing a boost with additional funding from federal partners, including \$1 million from the U.S. Army Corps of Engineers and \$3.1 million appropriated by Congress as part of the Lake Tahoe Restoration Act.

"Prevention, early detection, and control programs are the best defenses against aquatic invasive species at Lake Tahoe and offer the best hope for successful management of aquatic invasive plant infestations," said Dennis Zabaglo, aquatic resources program manager for TRPA.

"Although aquatic invasive plants can be difficult and costly to control once they are widely established, our strategy for Lake Tahoe has shown we can control these infestations."

Brenna Blessing is the outreach specialist at Tahoe Resource Conservation District.

Keys residents battling invaders on many fronts

As infestations worsen, property owners test innovative weapons to keep lagoons clear

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

The Tahoe Keys Property Owners Association (TKPOA) is working on multiple fronts to combat the harmful aquatic invasive species in its canals and lagoons—plants like Eurasian watermilfoil and curlyleaf pondweed, and the non-native bullfrogs and warm water fish that can follow their spread.

“These aquatic invasive plants are a problem throughout Lake Tahoe, cover most of the Tahoe Keys, and it’s getting worse every year,” said Andrew Kopania, chair of the Tahoe Keys Water Quality Committee, a subgroup of the Board of Directors.

“They’re a threat to Lake Tahoe’s environment, recreation, and economy,” Kopania added. “We need to continue to act to address that threat, using the best science, collaborating with stakeholders, and implementing effective controls.”

No one knows how Eurasian watermilfoil and curlyleaf pondweed first arrived in Lake Tahoe and the Tahoe Keys, but they were most likely transported to the lake by a boat or a dumped fish aquarium.

Eurasian watermilfoil was first found in Lake Tahoe in the 1970s. Curlyleaf pondweed—potentially a larger threat because of its ability to live in colder open water—was first identified in the Tahoe Keys in 2003. The aquatic invasive plants found an immediately suitable habitat in the shallow, warm waters of the Tahoe Keys.

TKPOA has tried to manage the infestation for recreation purposes through manual harvesting since 1984, spending as much as \$400,000 a year. However, while harvesting the dense mats of the plants helps to clear the channels temporarily, resulting plant fragments increase the growth and spread of the population.

A 2009 survey of the Tahoe Keys found approximately 70 percent of its 172 acres of lagoons infested. And in the last five years, it is estimated that curlyleaf pondweed coverage has increased up to 35 percent. Today, more than 90 percent of the Tahoe Keys is infested.

For several years, TKPOA has been working with TRPA, Tahoe Resource Conservation District, and Lahontan



Photo: Tahoe Keys Property Owners Association

A crew rakes up aquatic weeds to clear the way for boat traffic.



Harvesting Eurasian watermilfoil and curlyleaf pondweed has helped keep boat channels open in the Tahoe Keys, but the weeds have spread and approximately 70 percent of the 172 acres of lagoons are infested.

Regional Water Quality Control Board to develop a comprehensive management plan with strategies to address the invasive species.

TKPOA has researched methods and consulted with a wide range of scientific experts from around the country to fight aquatic invasive species.

The weed-harvesting program in the Tahoe Keys is now picking up four times as many plant fragments as before. This is important because small fragments of the plants can easily break away and start new infestations in other locations.

TKPOA has installed a boat back-up station near the Tahoe Keys entrance to Lake Tahoe, where boat operators are asked to stop and put their boat in reverse to remove any weed fragments that may be attached to the propeller to keep them from being carried into the lake.

Changes are also being made on land. TKPOA has put in place new landscaping and irrigation rules to reduce stormwater pollution and keep nutrients like phosphorus and nitrogen out of the canals and lagoons where they can fuel plant growth.

TKPOA is also working with partner agencies on test projects to identify new methods to control aquatic invasive species.

Continued on page 25

Despite removal, weeds threaten to return

Science guides attack plan on invasives

By Jim Sloan

TAHOE IN DEPTH

While Tahoe's boat inspection program has become a model for resource managers across the country, the inspections are just a part of the overall work to prevent and control aquatic invasive species at Lake Tahoe.

In places where invasives have achieved a foothold, the Tahoe Regional Planning Agency, the Tahoe Resource Conservation District (Tahoe RCD), and other resource agencies, nonprofits, and researchers in California and Nevada have assaulted infected areas with a battery of high-tech attacks and old-fashioned hand-to-hand combat.

Tahoe RCD has had great success removing Eurasian watermilfoil from parts of the lake, including Emerald Bay, Crystal Shores, and Tahoe Vista, while continuing work at Lakeside Marina, Fleur du Lac, and the Truckee River.

Lakeside Marina removal work

At Lakeside Marina, for instance, 1.5 acres are in the process of being treated. The plant infestations were surveyed and divers from Marine Taxonomic Services placed the barriers and suctioned up the plants.

Tahoe RCD has conducted a pilot project in which ultraviolet light is used to damage the plant cells of aquatic invasive plants. This project was funded by the Tahoe Fund and the California Tahoe Conservancy, and the technology was provided by John Paoluccio, the president of Inventive Resources, Inc. Paoluccio originally developed the UV light application 10 years ago as a means of removing algae from the walls of caves that couldn't be treated with chemicals or touched. When he heard about the weed problem at Tahoe, where he has a summer home, he offered to test his system on Eurasian watermilfoil and curlyleaf pondweed infestations.

It looks promising.

In the lab, "time-lapse video shows the plants dying back and disintegrating," said Nicole Cartwright, Tahoe RCD executive director.

Monitoring of that project is still ongoing as researchers also examine if the UV light had any effect on water quality, temperature, and native macroinvertebrates.



Photo: Tahoe Resource Conservation District

Crews remove bottom barriers used to kill aquatic invasive species on the South Shore of Lake Tahoe.

"Partners in the Lake Tahoe Aquatic Invasive Species Program have collaborated to treat more than 36 acres of invasive plants since 2005."

Dennis Zabaglo, Tahoe Regional Planning Agency

Despite these encouraging results, Cartwright notes that the crews must continue to monitor treated areas to ensure the invaders don't return. And some of the techniques that have worked on Eurasian watermilfoil haven't worked as well on curlyleaf pondweed, which produces hard-shelled seeds called turions that often survive the best efforts to eliminate them.

"We've learned how to control satellite populations, but the Tahoe Keys will continue to be our source until we control the problem there," Cartwright said. "And we haven't conquered anything that large yet."

Progress in the Keys

Dennis Zabaglo, the aquatic resources program manager at TRPA, said the Tahoe Keys Property Owners Association has worked for years to control the spread of aquatic invasive weeds in the development's various lagoons. The Keys area was originally a marsh before it was developed with homes and manmade waterways, and Zabaglo noted that the former marsh area naturally has a lot of nutrients and protection from open

water that makes it a productive breeding ground for invasive weeds and animals.

"The Keys area is ground zero for the spread of these invasives to the lake," Zabaglo said.

In addition to manually removing the weeds, which can make navigation difficult, the property owners have installed a back-up station where boats heading out to open water can pause and briefly go into reverse as a way of releasing any weed fragments before they reach the lake. TKPOA has also deployed a "bubble curtain" that boats will be able to drive through on their way out to the lake to dislodge weed debris.

The problem of aquatic plants in the Keys has remained so persistent that the property owners have applied for permission to test herbicides on the weedy areas. That proposal will become part of a larger environmental impact study considering a wide array of treatment options before it can move ahead.

"The potential use of an herbicide in the Tahoe Keys is of great interest to the public and a great concern to some," Zabaglo noted. "An environmental

analysis will help us understand the risks and whether it's appropriate from an environmental standpoint. We need to investigate all the different methods, so it's important to make this part of a comprehensive analysis."

Challenges on the horizon

Holding back the spread of aquatic invasive species is just part of the test as resource managers work to maintain Tahoe's clarity and fragile ecosystem, Zabaglo said. New threats are always popping up, and climate change that is slowly warming Tahoe's water is inviting to new invaders.

"There will inevitably be something new — a new weed or a new animal — that is harder to eliminate or harder to detect," he said.

Gaining a comprehensive view of the problem and the threats is important, so Zabaglo is looking forward to a study this summer that will survey the entire lake and its tributaries to assess and document satellite populations of aquatic invasive species. That kind of overview hasn't been done to this scale but is critical to helping resource managers identify areas that need attention.

"We need to stay ahead of the problem as best we can," Zabaglo said. "Once we know the scope of the problem, we'll be in a better position to eradicate isolated populations and focus on larger infestations."



Photo: U.S. Forest Service

Kayaker Matt Dickinson heads out for a paddle. All visitors with non-motorized watercraft are asked a series of questions when using developed Forest Service recreation sites to ensure their vessels are not spreading aquatic invasive species. Learn more at Tahoekeepers.org.

Forest Service screening non-motorized watercraft at National Forest sites

Meeks Creek eradication project also part of agency's overall work to prevent unwanted species

By Jaclyn Tain

U.S. FOREST SERVICE

Around the country, the transportation of aquatic invasive species from waterbody to waterbody is on the rise. For the past 10 years, agencies around the Lake Tahoe Basin, including the U.S. Forest Service Lake Tahoe Basin Management Unit (LTBMU), have worked together to prevent new infestations and control existing populations in the lake.

The LTBMU manages the public access of over 74 percent of the land in the Lake Tahoe Basin. Thus, the involvement of the LTBMU in the aquatic invasive species program is essential.

While motorized boat inspections have been extremely successful, non-motorized vessels pose a threat for

spreading aquatic invasive species as well. Aquatic hitchhikers do not have a preference between motorized and non-motorized crafts and can attach to kayaks, paddleboards, rafts, and canoes. They can hide on hulls and rudders, and in hatches, cockpits, and gear.

All visitors with non-motorized watercraft entering developed Forest Service sites are asked a series of questions to ensure their watercraft is clean, drained, and dry.

Many National Forest sites at Lake Tahoe are managed by concessionaires and permittees that operate under a special-use permit to provide recreation services to the public.

"Our permittees are diligent in their work, ensuring all visitors are properly screened at non-motorized vessel entry

points," said LTBMU aquatic biologist Sarah Muskopf. "They are essential in the fight against aquatic invasive species."

These sites include the beaches along the Pope-Baldwin corridor in South Lake Tahoe, Meeks Bay Resort and Meeks Bay Campground, Round Hill Pines, Nevada Beach, Zephyr Cove Resort, and Echo Lakes.

Throughout the course of a single season, permittees who manage these sites talk to thousands of visitors about protecting Lake Tahoe. This not only prevents new infestations, but also educates a vast number of people who visit the lake about the consequences of aquatic invasive species and the importance of prevention.

The Forest Service, with funding support from the California Tahoe Conservancy, will implement a project

that will remove aquatic invasive plants where Meeks Creek meets Lake Tahoe. In this area, the population of invasive plants is up to an acre in size and is considered a high-priority to remove the infestation.

Work on the control project is slated to begin this summer and will use proven methods for this size and scale of infestation—mainly bottom barriers and diver hand-pulling.

"Program partners are excited to see this project begin as controlling this isolated population has the potential to make the West Shore of the lake entirely weed free," said Dennis Zabaglo, aquatic resources program manager for TRPA.

Jaclyn Tain is a public affairs assistant and conservation education resource assistant for the U.S. Forest Service.

New hope for Tahoe’s largest watershed

Acquisition of Johnson Meadow marks major milestone for lake protection

TAHOE RESOURCE CONSERVATION DISTRICT

The largest privately owned section of the Upper Truckee River, Johnson Meadow, is now publicly owned by the Tahoe Resource Conservation District (Tahoe RCD), setting the stage for the most ambitious restoration initiative in the Lake Tahoe Basin.

“This historic acquisition will jump start a collaborative effort to restore the river, improve wildlife habitat, and provide public access to visitors and the local community,” said Nicole Cartwright, executive director of Tahoe RCD.

The Upper Truckee River watershed is the most impaired in the Tahoe Basin and a major contributor of fine sediment that impacts the clarity of the lake. The goals of the restoration strategy, which includes major projects by the California Tahoe Conservancy, the U.S. Forest Service, the City of South Lake Tahoe, and California State Parks, will be to restore over 1,000 acres of unique and valuable habitat and reduce stream erosion by more than 50 percent.

The purchase of the \$8.3 million, 206-acre property was made possible through a collaboration between Tahoe RCD, the California Tahoe Conservancy, California Department of Fish & Wildlife, Tahoe Fund, and the former property owners, who owned Johnson Meadow for almost a century.

“The Mosher family has a rich history in Lake Tahoe and for almost a century protected this land from development,” Cartwright said. “Their love for Lake Tahoe and the beauty of this meadow is greatly appreciated in making this acquisition a reality.”

Johnson Meadow was privately owned for over 100 years and was used as a dairy farm following the Gold Rush. From the 1930s, the meadow was used for summer cattle grazing. The property has been a sought-after acquisition by the partners of the Upper Truckee River Watershed Advisory Group to complete the public ownership of the entire 9 miles.

“This is the final large piece of the puzzle necessary to unlock what will be Tahoe’s largest restoration effort to date,” said Amy Berry, CEO of the Tahoe Fund. “It took an epic collaboration to make this acquisition possible. We are incredibly



Johnson Meadow, above, drains into Lake Tahoe. The purchase of its 206 acres for \$8.3 million by the Tahoe Resource Conservation District opens the door for restoration projects up and down the Upper Truckee River watershed, which is a major source of fine sediment that affects the clarity of Lake Tahoe. Restoration projects include work by the U.S. Forest Service, the California Tahoe Conservancy, the City of South Lake Tahoe, and California State Parks. The projects will reduce stream erosion by 50 percent.

grateful to have received early support and initial funding from Barton Health and Heavenly Mountain Resort.”

Over the next several years, Tahoe RCD and its partners will need to secure \$10 million to \$15 million in funding to restore Johnson Meadow, and more than \$60 million for the comprehensive plan to restore the Upper Truckee River watershed.

“In the short term, Tahoe RCD and our partners are considering options for a temporary bridge or access across the river to reconnect the Sierra Tract and 4th Street neighborhoods,” said Cartwright. “The long-term strategy will ensure that locals and visitors have access to this treasured landscape.”

For more information on the acquisition or scheduled restoration work, visit TahoeRCD.org.

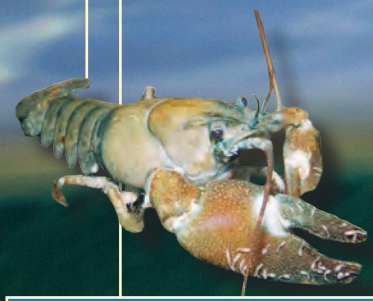


Aquatic Invaders

Whether planted by people or introduced accidentally, non-native aquatic invasive species have had a big impact on the Tahoe environment. Although some species were introduced more than a hundred years ago, the threat of more invaders increases each year. Here are some of the species that have had the biggest impact and when they first appeared at the lake.

10 years
fighting
invasive
species

2004: Non-native American bullfrog discovered on the South Shore, with breeding populations in Sawmill Pond, Seneca Pond, Taylor Creek, and Lake Baron.



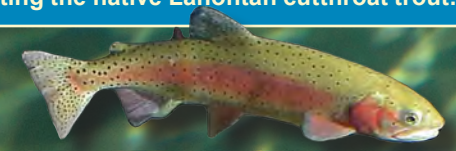
1895: Crayfish introduced to Marlette Lake, and signal crayfish introduced to Lake Tahoe four times between the late 1880s and the 1930s.



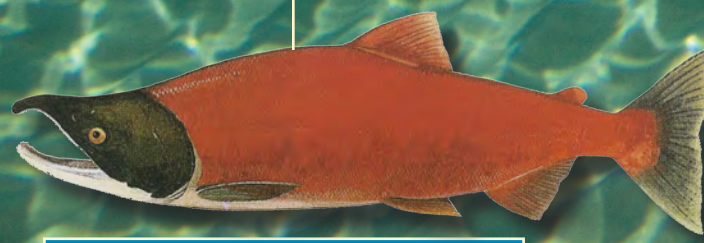
Mid-1930s: The last of the signal crayfish introduced to Lake Tahoe. All invertebrates except crayfish decline. Native Tahoe stonefly, the Tahoe blind amphipod, and the Tahoe flatworm among the victims.



1896: Mackinaw introduced from the Great Lakes as a sporting alternative to Tahoe's native Lahontan cutthroat trout. Within two years, lake trout are Tahoe's dominant fish, eliminating the native Lahontan cutthroat trout.



1960: The food web of Tahoe now dominated by kokanee salmon and lake trout. Lake trout feed on native fishes across habitats. Kokanee salmon feed on native zooplankton that graze on algae particles in the open water. Rainbow and brown trout also become established.



Mid-1940s: Kokanee salmon accidentally introduced from a North Shore hatchery. It becomes an important sport fish.



1963: Mysis shrimp introduced as a game fish food supplement, the last sanctioned introduction of a new species to Tahoe.



2002: Asian clams discovered near Nevada Beach. They have since spread throughout the South Shore, affecting beach aesthetics and nearshore algal populations.

2009: Research suggests that suitable habitat for non-native, warm water fish has increased with the spread of aquatic weed beds.



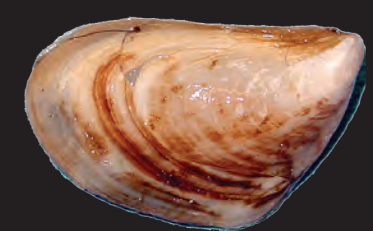
Eurasian watermilfoil

Early 1970s: Eurasian watermilfoil observed in the Tahoe Keys area of South Lake Tahoe.



2003: Curlyleaf pondweed discovered on the South Shore. It has since spread along the South Shore, inhibiting recreation and impairing water quality.

2018: 10-year anniversary of the Watercraft Inspection Program and the fight against aquatic invasive species. No quagga mussels detected in Lake Tahoe.



quagga mussel

Program prescribes Vitamin N(ature) to help healing

Wellness Outings program teams patients with rangers for guided walks that improve health

By Megan Dee

U.S. FOREST SERVICE

We all like the sound of “wellness,” but what does it mean? Wellness can be defined as being healthy physically, emotionally, and socially.

Improving our wellness can mean a meandering walk on the edge of Taylor Creek Marsh, snowshoeing along Tallac Historic Site’s shoreline during a full moon, or spotting migrating birds during an outing at scenic Cove East.

An individual can walk away from these outings feeling refreshed, rejuvenated, and connected to nature.

For Barton Health and the U.S. Forest Service Lake Tahoe Basin Management Unit (LTBMU), wellness means working together to improve the community’s health by simply being in nature.

These two organizations are working together to provide Wellness Outings—guided walks in the National Forest that promote nature as medicine by teaming patients with Forest Service rangers and physicians or nurses.

In addition to Wellness Outings, the partnership will provide wellness and injury-prevention trainings for Forest Service wilderness rangers and firefighters, as well as accessibility to public lands to promote outdoor recreation and further research on the health benefits of getting outdoors.

At the heart of this collaborative public-private partnership lies the delivery of therapeutic, nature-based experiences on National Forest lands that benefit people with chronic illness, people recovering from major surgery, at-risk youth, and minority populations in Lake Tahoe. By uniting the largest non-profit health provider in the Lake Tahoe Basin with the primary land manager, the two partners have forged a natural alliance between public lands and community health.

“Barton recognizes the importance of our surrounding forest lands, which provide an inspiring setting to achieve personal health-related goals during recovery and treatment,” said Dr. Clint Purvance, Barton Health President and CEO.

Why the need to combine forces? In 2015, Barton collected public health data to identify critical health needs in South Lake Tahoe. Results suggested the community’s chronically ill and minority populations are at risk for isolation, increased injury



Photos: U.S. Forest Service

The U.S. Forest Service’s Joe Flower (top photo) talks with two Barton Wellness Outing participants, then pauses for a group picture (bottom photo). The program is designed to help patients feel better by visiting nature and is a partnership between the U.S. Forest Service and Barton Health.

rates, and health and wellness deficits. In response, Barton started a comprehensive campaign to build community health partnerships with local employers and to pursue health grants that help meet medical needs. In 2016, Barton and the LTBMU entered into a cooperative community wellness partnership.

Barton Health physician and orthopedic surgeon Dr. Stephen Bannar, registered nurse Khristy Gavigan, and LTBMU Natural Resources Specialist Joseph Flower presented the Wellness Outings program at RecX, a conference run by the U.S. Department of the Interior in Washington, D.C. The conference focused on “Great

Ideas for the Outdoors” and the Barton team shared the successes of the Wellness Outings and the implications for health across the country.

“We are delighted to reaffirm our combined commitment to provide therapeutic experiences on National Forest lands,” said Flower. “This is an amazing opportunity to serve at-risk populations in our community and promote the healing benefits of nature and the outdoors.”

Research indicates that time in nature lowers blood pressure, heart rate, and cortisol levels. It increases concentration, memory, and attention spans. It has been shown to boost immunity and is particularly beneficial for people recovering from surgery who often spend less time outside. Exposure to nature can reduce stress levels by as much as 28 percent in children. Minority and low-income children are particularly affected, according to the National Environmental Education Foundation.

By safely acquainting Wellness Outing participants with the outdoors, people are taught to use their senses as they begin to replace feelings of fear and discomfort with feelings of connection and identity. These benefits were something Bannar wanted his patients to experience—and he decided to prescribe nature as medicine.

“A prescription for nature can enable accessibility for at-risk groups as well as preventive medicine for other members of the community,” Bannar said. “We need to change our mindset from treating disease to promoting wellness.”

Through this pioneering partnership, Barton and the LTBMU have created a national model for increased engagement among health care providers and land management agencies for the benefit of all Americans. Community health and environmental awareness can be improved simultaneously as we research and explore the many health benefits of nature, with the Lake Tahoe environment serving as the prime venue for optimal healing.

Community members can watch the RecX presentation and get additional information about Wellness Outings at BartonHealth.org/WellnessOutings and fs.usda.gov/lfbmu.

Megan Dee works for the LTBMU Conservation Education and Interpretive Services program. She educates K-12 students and adults, working with the community and cultivating partnerships to build environmental stewardship.

Shoreline plan moves to decision

Proposal would enhance recreation while protecting the lake's sensitive areas

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

Building on a collaborative, two-year planning process, the Tahoe Regional Planning Agency is moving toward completion and potential adoption of a new shoreline plan for Lake Tahoe this fall. The plan would mark a major update to TRPA shoreline regulations and forge new compromises among stakeholders on new shoreline structures.

TRPA and nearly a dozen partner agencies and groups have been working together as the Shoreline Steering and Joint Fact-Finding Committees to create a plan for piers, buoys, boat ramps, and marinas—the shoreline structures people use to access Tahoe.

Tahoe's shoreline is a place of great natural beauty. And it's where people go to experience and enjoy the lake, whether they are swimming, fishing, launching boats, wakeboarding, waterskiing, or going for a daily paddle.

The goal is a shoreline plan that protects or improves the environment and scenic beauty of Tahoe's 72 miles of shoreline, enhances recreation access, and allows temporary strategies to keep more shoreline structures functional during low-lake levels.

Shoreline partners reached a major milestone this spring, when they released a draft environmental review for a proposed plan on May 8. The draft is out for public review and comment until July 9. The draft review examines the proposed shoreline plan endorsed by Shoreline Steering Committee members and TRPA's Regional Plan Implementation Committee, as well as several potential alternatives to the proposed plan.

"We're grateful to the staff at TRPA and all the other participating agencies and organizations who have spent hundreds of hours in meetings to develop these new proposed policies," said Darcie Goodman Collins, Ph.D., executive director of the League to Save Lake Tahoe. "This has been an open and transparent process and we're confident that it will produce a plan that gets adopted."

What's in the plan

The proposed plan would authorize a range of new shoreline structures at Tahoe over the course of many years,



Photo: Drone Promotions

TRPA's proposed shoreline plan considers shoreline structures with temporary features to function during low lake levels.

including two new public boat ramps, 10 new public piers, and up to 128 new private piers. The private piers would be authorized gradually, and the program would prioritize piers that serve multiple property owners or retire pier development potential on other properties. The proposed plan would also allow up to 1,486 new buoys for lakefront properties and homeowner associations and create a reserve pool of 630 buoys or boat slips for use by marinas and public agencies.

No new marinas would be allowed under the proposed plan. But marinas could expand or reconfigure facilities if they become certified as a "clean marina" and incorporate environmental improvements into projects, such as work to control aquatic invasive species, reduce stormwater pollution, or provide cleaner, more efficient boat rental fleets.

The proposed shoreline plan would maintain Tahoe's 600-foot no-wake-zone to reduce shoreline erosion and conflicts between motorized and non-motorized watercraft and swimmers. It would expand the no-wake-zone to include all of Emerald Bay, the most heavily visited site on the lake. TRPA is working with marinas, law enforcement, state parks, and other shoreline partners on ways to improve boater education and enforcement of the no-wake-zone.

During the last drought, many

shoreline structures became unusable as lake levels dropped below Tahoe's natural rim. The proposed plan includes a variety of adaptation strategies to keep structures functional during low lake levels. People would be able to install lakeward buoy anchors to temporarily move buoys into deeper water during low lake levels. The proposed plan also includes provisions for boat ramps to be temporarily extended farther into the lake, and for marinas to install an additional lakeward row of buoy anchors and floating pier extensions for temporary use during low lake levels.

Stay informed

TRPA and its shoreline partners will host community workshops, public hearings, and meetings this summer and fall to get additional public feedback as the shoreline plan continues to move toward decision.

"We look forward to receiving more comments and ideas on the shoreline plan proposals. By continuing to work together, we think we can come up with a widely supported plan that protects Tahoe's environment and the scenic beauty of its shoreline, and helps people get out on the lake to enjoy one of the greatest recreation experiences in the world," said Joanne Marchetta, executive director of TRPA.



Sign up for email alerts about upcoming meetings on TRPA's shoreline plan.

Learn more about proposed shoreline plan at shorelineplan.org

- Sign up for email alerts about upcoming meetings
- Read the shoreline plan and environmental reviews
- Share comments on policy proposals, the draft environmental review, and ask questions
- Request a community presentation about the shoreline plan

Transitional shorezone permit process

TRPA has put in place a temporary, transitional shorezone permitting process. As of May 25, the agency is no longer accepting applications for the addition, modification, or expansion of existing shoreline structures until new shoreline regulations take effect January 1, 2019. Importantly, TRPA is continuing to accept shorezone applications for repairs, maintenance, and public health and safety projects, and is also continuing to process exempt and qualified exempt shorezone activities.



Property, permitting info now available online

A new online service called the Parcel Tracker launched this year and puts a wide range of property information at the fingertips of anyone with an Internet connection.

"We believe this Parcel Tracker service provides unprecedented access to property information for the public," said Ken Kasman, division manager of research and analysis at the Tahoe Regional Planning Agency (TRPA).

The Parcel Tracker is a valuable tool for anyone who is considering buying or investing in property in the Lake Tahoe Region.

Part of the Lake Tahoe Info web portal, the Parcel Tracker provides convenient access to TRPA's database of land capability scores.

The Parcel Tracker shows:

- If a property has a best management practices certificate.
- The jurisdiction and the local area plan, plan area statement, or community plan where a property is located.
- The property's address, estimated boundary lines, and assessor's parcel number.
- TRPA-related deed restrictions associated with a property.
- If any development rights are banked on a property or have been transferred off a property.
- A complete history of TRPA applications, permits, and site plans for a property, as well as electronic copies of permits.

"In the past, people needed to make multiple phone calls and office visits to get the kind of information we are now providing through the innovative Parcel Tracker," Kasman said.

People who visit the Parcel Tracker and don't find the information for a property that they are looking for can click a "Request Updated Information" button. That prompts TRPA staff to retrieve information from the agency's paper files and upload it to the Parcel Tracker.

Developed by TRPA and Sitka Technology Group, Lake Tahoe Info is a growing web portal that provides online access to a wide variety of information about the Lake Tahoe Region. Other tools on Lake Tahoe Info:

- Lake Tahoe Environmental Improvement Program Project Tracker: documents more than 500 lake-saving projects completed over the last 20 years.
- Monitoring Dashboard: Provides data

Continued on page 21

Development rights get overhaul

Private investment key way to get environmental improvements

By Adam Jensen

TAHOE REGIONAL PLANNING AGENCY

Those who have visited Lake Tahoe know it's one of a kind. What's lesser known is that the Lake Tahoe Basin has a unique system of private property development rights established to protect this national treasure.

The development rights system began in the 1980s and is central to the Tahoe Regional Planning Agency's management of growth in the Lake Tahoe Basin. It is designed to ensure development will help achieve a wide range of environmental goals.

It has also become clear the system is not well understood or easy for investors and developers to use.

Development rights, formerly known as commodities, are entitlements one must acquire before developing a property and can include commercial floor area, tourist accommodation units, existing residential units, residential development rights and allocations, land coverage, and restoration credits.

"The Lake Tahoe Regional Plan recognizes the importance of redevelopment," said Jennifer Self, a senior planner with TRPA. "Private investment in our communities is a key mechanism for getting environmental improvements on the ground. We want to make sure our systems are encouraging this type of redevelopment and not hindering progress."

Since September 2015, a dedicated group has been meeting to discuss how to better manage growth, support environmentally beneficial and economically feasible redevelopment, and improve the effectiveness and predictability of the current development rights system.

The Development Rights Strategic Initiative Working Group includes representatives from the environmental and business sectors, state land banks, California Attorney General's Office, the TRPA Advisory Planning Commission, and the Regional Plan Implementation Committee.

The working group released recommendations in September 2017. A formal environmental review of the recommendations is anticipated this summer, with the final approval and adoption in September and October. All



Photo: Vance Fox

For the Tahoe Beachfront Residences project in Kings Beach, Todd Davidson and partners retired an outdated lakefront hotel in Kings Beach to build this residential project. The project, which won a Best in the Basin award, reduced the number of units on site and vehicle miles traveled, reduced impervious coverage by 11 percent, installed best management practices to improve water quality and improved scenic qualities from the lake and highway.

working group meetings and approval hearings will include opportunities for the public to comment on the proposals.

"The working group partnered with a national expert in development rights systems to look at best practices from around the country and see what we could model right here in Tahoe," Self said.

Under the recommendations, TRPA would make five key improvements that would increase flexibility and create a more user-friendly system while still maintaining the overall development cap for the basin:

- Allowing for the conversion or exchange of development rights from one type to another to allow for more flexibility and responsiveness to market demands. The system no longer has rigid silos of development types.
- Eliminating local government approval of development rights transfers across jurisdictional boundaries to simplify the system and reduce fees. A local jurisdiction would have the option to reinstate the so-called "veto" if it saw a net loss of 5 percent of existing development rights over a two-year period.
- Strengthening partnerships between TRPA and the California and Nevada land banks to increase development

rights inventories. This partnership would help accelerate the goals of the Regional Plan by retiring development on sensitive lands and transferring the development rights at low cost to projects in town centers.

- Improving the transfer-of-development-rights system to increase predictability and make the system more user-friendly. A few key improvements include eliminating a requirement to have an approved project prior to a transfer, expanding tracking and inventory capabilities on LakeTahoeInfo.org, and highlighting successful redevelopment projects.
- Allocating a portion of the residential bonus units for local achievable housing—housing for those who earn too much to qualify for affordable and moderate-income housing but too little to afford the median market-priced multi-family or single-family unit. These bonus units would be awarded essentially free of charge to eligible projects.

"All in all, we've heard from community groups that we're moving in the right direction," Self said.

For more information on development rights and public meetings, visit trpa.org.

Adam Jensen is an environmental education specialist for the Tahoe Regional Planning Agency.

Nevada license plate program turns 20

Some 145 Tahoe projects have been funded by Silver State drivers

By Meredith Gosejohan

NEVADA DIVISION OF STATE LANDS

This year marks the 20-year anniversary of the Nevada Lake Tahoe License Plate Program. Since the first Tahoe license plates were sold in February 1998, the program has generated more than \$8.1 million through sales and annual renewal fees, funding over 145 preservation and restoration projects in the Lake Tahoe Basin. Funded projects include scientific research on the water quality and clarity of Lake Tahoe, parking lot and trailhead improvements at Spooner Summit, and even the publication of *Tahoe In Depth*.

The Nevada Division of State Lands began holding public input and outreach workshops in 1997 to identify projects that were most important to stakeholders. Lake Tahoe Nevada State Park improvements ranked as a leading priority, and over 25 park projects have been completed to date. Every year, grant applications for implementation, education, research, and monitoring projects are solicited from public agencies. An advisory committee reviews the applications and prioritizes environmental projects for funding.

"The Lake Tahoe License Plate program helps further the shared mission of the Nevada Division of State Lands and its partner agencies to preserve and protect natural resources within the basin," said former State Lands Administrator Pam Wilcox, who helped spearhead the program in Nevada. "Building on the success of California's Tahoe license plate program, and realizing the need to create a funding source for Lake Tahoe projects in Nevada, we were excited to have the opportunity to expand the program to our home state. For a number of years, it was one of the most popular charitable plates in Nevada, and it has been very rewarding to see firsthand the many benefits this program has provided to the beautiful Lake Tahoe area over the past two decades."

The program has grown over the years, and today there are nearly 19,400 Lake Tahoe license plates on the road in Nevada. The plate is the third most popular specialty plate in Nevada history, following the Las Vegas Centennial and 150th Nevada Anniversary plates, and is one of only



Photo: Nevada Division of State Lands
Nearly 20,000 Lake Tahoe license plates are on the road in Nevada.

two plates that can be personalized with seven letters or numbers. All of the other specialty plates allow only five or six letters or numbers.

A portion of license plate purchase and renewal fees, including \$25 the first year and \$20 each additional year, support preservation and restoration work in the basin through grants. The program provides approximately \$350,000 annually for projects ranging from water-quality initiatives and state-park improvements, to research and monitoring studies, invasive species surveys and removal, and public education and outreach.

In 2018, the program will provide funding for six projects including:

- Aquatic Invasive Species Surveillance Monitoring: Tahoe Regional Planning Agency will conduct a lakewide survey and develop a surveillance monitoring plan.
- Lake Tahoe Water Trail Educational Wayfinding Interpretive Signage: Tahoe Resource Conservation District, in collaboration with Sierra Business Council, will install sign panels and stands at five sites along the Lake Tahoe Water Trail to promote safety and natural resource stewardship.
- Operational Remote Sensing to Support Lake Tahoe Nearshore Monitoring: Scientists at Desert Research Institute plan to develop empirical water-quality tracking algorithms and predictive water-quality indices using imagery and historic nearshore water-quality data. A web application will also be customized for Lake Tahoe allowing the public to monitor water quality and vegetation conditions using imagery and climate data.
- Aquatic Invasive Plant Control at Elk Point Marina: Tahoe Resource Conservation District will remove aquatic invasive plants, including Eurasian watermilfoil and curlyleaf pondweed, from the nearshore environment at Elk Point Marina. This project is the first of its kind in which a private homeowners association is providing the 25 percent match required by the program.
- Outreach and Education for the Lake Tahoe Shoreline Plan: Tahoe Regional Planning Agency will reach out to stakeholders, residents, and visitors to provide public meetings along with education and outreach materials.
- A Sustainable Method for the Rapid Assessment of the Extent and Causes of Metaphyton in Lake Tahoe: Scientists at U.C. Davis' Tahoe Environmental Research Center plan to develop a lakewide approach to identify and quantify metaphyton using aerial imagery. This research aims to clarify the relationship between elevated nutrients and metaphyton growth, which may be linked to Asian clams, an aquatic invasive species.



Photo: Nevada Division of State Lands
Nevada's Tahoe license plate program has raised more than \$8 million and paid for such projects as this observation platform at Sand Harbor.

while offering Nevada drivers the unique opportunity to be a part of protecting this iconic destination. We'd also like to recognize those who have supported local conservation work over the years by purchasing a Tahoe license plate," said Charlie Donohue, Nevada Division of State Lands administrator. "The License Plate Program aligns with our commitment to improving and protecting our state lands, as well as preserving the area's natural surroundings, which will continue to benefit our residents and visitors for generations to come."

Nevada residents can purchase a new Tahoe license plate from the DMV for \$62 with an annual renewal fee of \$30. To learn more, visit dmv.nv.com/platescharitable.htm.

More information about the Nevada Lake Tahoe License Plate Program can be found at <http://lands.nv.gov/resource-programs/tahoe/water-quality/tahoe-license-plate-program>.

Meredith Gosejohan is the water quality coordinator on the Nevada Tahoe Resource Team and manages the Lake Tahoe License Plate Grant Program for Nevada Division of State Lands.

"Lake Tahoe is known around the world as a spectacular environmental treasure, and we want to recognize all of our partner agencies for their dedication to bringing the program to fruition,



Transportation plans will examine how to improve biking, walking, and transit services.

Transportation plans on the horizon

SR 89 Recreation Corridor Management Plan:

This plan focuses on the Southwest Shore from west of the “Y” to Tahoma and will collect data, public input, and plan solutions that will improve recreational access, better manage congestion, and improve biking, walking, and transit services. Keep a look out this summer for online and in-person surveys. Your survey responses help transportation planners know how to best serve you.

Lake Tahoe Region Safety Plan:

Safety statistics illustrate to funding organizations why an improvement project is needed. The plan will pull together safety data and identify gaps in information. Also, it will identify high-priority locations for safety improvements to support local governments applying for and receiving the necessary funds to make those improvements.

Road improvements planned for summer



Photo: Drone Promotions

Motorists may face delays between Sand Harbor and Incline Village this summer while crews work on 3 miles of trail that is designed to reduce future traffic in the area.

Short-term congestion the price we pay for long-term benefits

By Morgan Beryl

TAHOE REGIONAL PLANNING AGENCY

Local, state, and federal agencies will work this summer to improve roads and paths and add miles of sidewalks. This means residents and visitors can expect two things:

- Safer roads with more connections for walkers and cyclists.
- Construction-related congestion.

Improving Tahoe’s transportation system brings short-term trade-offs and comes with challenges.

2018 major projects

Along the East Shore, crews will install 3 miles of trail and parking from Incline Village to Sand Harbor. The trail will increase safety by reducing on-highway parking. However, the road will have one-way traffic for much of the summer and could create 30-minute delays for travelers.

On the South Shore, Caltrans will continue to protect Lake Tahoe’s clarity through stormwater improvements and

will add sidewalks along U.S. Highway 50 for pedestrian safety. Some lanes on U.S. Highway 50 will be closed at various times and in multiple directions, so plan ahead.

The City of South Lake Tahoe will begin construction on Sierra Boulevard, reconstructing the roadway, adding a sidewalk and path, providing intersection improvements, and planting native landscape vegetation.

The redesigned road will help walkers and bikers cross town from U.S. Highway 50 to Pioneer Trail and will include traffic calming, improved sight-distance, and formalized parking and lane configurations.

On the West Shore, a new path will connect Sugar Pine to Meeks Bay, creating more access to recreation destinations and increasing safety for all roadway users.

The North Shore is also undergoing a major project at Fanny Bridge, including roundabouts, a new bypass road, and rerouted paths. This project will increase

safety, better manage congestion, and create a beautiful gateway to Tahoe City. Detailed information on all of these projects and many more in the planning phase can be found online at transportation.laketahoeinfo.org

A vision for Tahoe transportation

What do all these projects have in common? Each successful transportation project at Lake Tahoe implements regional transportation goals. Roundabouts, new paths, and sidewalks help the environment, increase connectivity, improve safety, better manage operations and congestion, and add to the Region’s economic vitality and quality of life.

To avoid the congestion, leave early, ride a bike, walk, take a water taxi, or hop on transit instead of your car. Check out the new linkingtahoe.com website for more information on travel options.

Morgan Beryl is a senior transportation planner at the Tahoe Regional Planning Agency.

How Lake Tahoe got its name

Beloved waterbody has had several monikers

By McAvoy Lane

Lake Tahoe was formed two million and three years ago. I know this because a trustworthy Washoe elder told me Tahoe was formed two million years ago, and that was three years ago.

But how was it formed, you might ask. Well Mother Nature nearly burst her constitution in ramming tectonic plates together, igniting volcanic fireworks, and carving out Emerald Bay with a glacier. Fact is, if that glacier had pooped out and quit a hundred feet earlier, Emerald Bay would today be Emerald Lake.

Our jewel of the Sierra has had a few *nom de guerres* before settling on Tahoe. The first, bequeathed by our original inhabitants, our Native American Washoe, Paiute and Shoshone, was ‘Da ow aga,’ or Lake of the Sky. The first European-American to put a name to this heartbreakingly beautiful lake was explorer John Fremont back in 1844, who, for lack of imagination, called it, ‘Mountain Lake,’ which would never do. One of Fremont’s map makers called it, ‘Lake Bonpland,’ after a French botanist, but nobody outside of France could remember that name so it was forgotten.

The ‘100 drinks legislature’ of early California tried to name our lake, ‘Tula Tulia,’ but it died in committee. Then along came John Bigler, third governor of California, who had rescued some snowbound Echo Summit unfortunates back in 1852 and was rewarded with the placing of his name on top of ‘Da ow aga Mountain Lake Bonpland Tula Tulia.’ Yes, in 1854 our lake officially became, ‘Lake Bigler,’ which some said would be a perfectly good name, were the lake full of beer. Other doubters suspected Bigler had copperhead tendencies. One detractor asked, “How can you name a lake with no bottom after a man who is ALL bottom?”

In 1945 it was decided to dump Bigler and go with the original Native American name of ‘Da ow aga,’ which no elected European-American official could spell or pronounce correctly, and so we ended up with ‘Tahoe.’

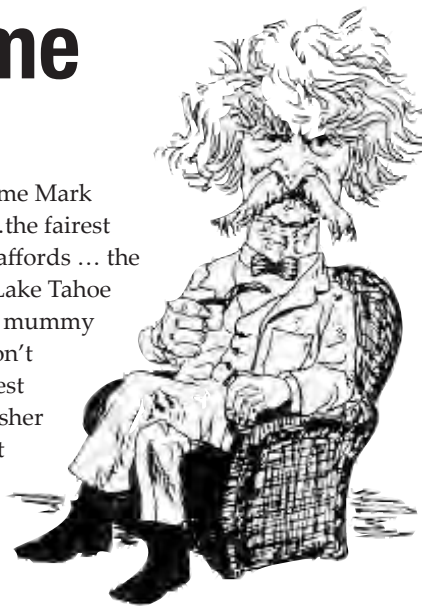
Then in 1861 along came Mark Twain, who called it, “...the fairest picture the whole earth affords ... the air that angels breathe. Lake Tahoe will restore an Egyptian mummy to his pristine vigor. I don’t mean the oldest and driest of mummies, but the fresher ones. The eye suffers but one grief, that it must close sometimes in sleep. It is a veritable habitation with the gods. No, if Lake Tahoe does not cure whatever ails you, I’ll bury you at my own expense.”

By the way, Mark Twain gets credit for the first prescribed burn in the Tahoe Basin, and it might be safe to say he started TRPA before there was a TRPA, though back then it might have been called the ‘Timber Ranch Planning Agency.’

In truth, our Tahoe Regional Planning Agency has done more to preserve the quality of our beloved lake than anyone could have imagined when founded back in 1969 to preserve, restore, and enhance our unique natural and human environment.

I hope to be around next year to celebrate the 50th birthday of our TRPA and propose a deserving toast. Should I be so lucky to live that long, and be in attendance for that auspicious occasion, please do tap me on the shoulder and shout “HELLO!” into my ear ... I’ll be the 183-year-old guy in the white suit.

For 30 years and over 4,000 performances from Virginia City to Leningrad University in Russia, McAvoy Lane has preserved the wit and wisdom of Mark Twain. McAvoy is a winner of the Nevada Award for Excellence in School and Library Service, and author of a book to be released this summer, Huck Finally Graduates!



Parcel Tracker provides a wide array of land information

Continued from page 18

- from various environmental health monitoring programs.
- Sustainability Dashboard: Shows the status of sustainability indicators for the Lake Tahoe Region.
 - Transportation Tracker: Reports on actions TRPA and partner agencies are taking to implement Tahoe’s regional transportation vision.
- “The LakeTahoeInfo.org web platform is one more example of TRPA’s drive toward enhanced transparency and public service,” Kasman said.
- Lake Tahoe Info was made possible with financial support from the U.S. Environmental Protection Agency through the Southern Nevada Public Land Management Act, the California Strategic Growth Council, and the Nevada Division of Environmental Protection.
- For more info:
- Lake Tahoe Info: laketahoeinfo.org
 - Parcel Tracker: parcels.laketahoeinfo.org

TAMBA and partners have been busy building multi-use trails throughout the Tahoe Basin

By Amy Fish

SPECIAL TO TAHOE IN DEPTH

Multi-use trails connect our communities to the forest, and the non-profit Tahoe Area Mountain Biking Association (TAMBA) and its public partners are working on trail projects that benefit public recreation and the environment at Lake Tahoe, harnessing the power of hundreds of volunteers.

TAMBA has formal partnerships with local land management agencies including the U.S. Forest Service, Nevada State Parks, California State Parks, and the City of South Lake Tahoe.

Through these partnerships and the nonprofit’s dedicated volunteers, TAMBA is focused on improving outdoor recreation opportunities at Tahoe, connecting trails to communities, and ensuring Tahoe’s trails are sustainable

and environmentally friendly.

Last year, TAMBA hosted 180 volunteer trail days with 8,700 volunteer hours of trail building and maintenance around Lake Tahoe.

South/West Shore projects

- Valley View Trail: Volunteers rebuilt the lower section of the trail on Tahoe Mountain last spring after erosion from the massive winter swept out much of the trail. The new route contours the landscape, providing a more sustainable trail alignment.
- Corral Trail: More jumps and berms were built on one of the most popular trails at Tahoe.
- Angora Ridge/Fallen Leaf Lake Trail System: Volunteers built 5 miles of new trail in partnership with the



Photo: Ben Fish
Riders make their way down the Angora Ridge Trail.

Continued on page 22

Group works to enhance Tahoe's trail network

Continued from page 21

Forest Service. This trail system is in the Angora Fire burn area and links the North Upper Truckee neighborhood to Angora Lake and Fallen Leaf Lake.

- **Bijou Bike Park:** The jump lines and pump tracks were upgraded keeping the 5-acre bike park in top shape. The bike park is owned and operated by the City of South Lake Tahoe and open to the public for free.

North Shore projects

- **Incline Flume Trail:** TAMBA adopted and upgraded the trail in partnership with the Tahoe Rim Trail Association, Friends of Incline Trails, and the Tahoe Fund. This historic trail, known as "The Other Flume Trail," connects Mount Rose Highway to Tunnel Creek Road with amazing Lake Tahoe views.
- **Elevator Shaft:** The Tahoe City trail was rerouted and a new section of trail built to fix a 25-year-old erosion problem. The reroute allows bikers, hikers, and trail runners to access the Tahoe Rim Trail from the Tahoe City Nordic Center via a fun new single-track trail with panoramic views of Lake Tahoe.
- **Burton Creek State Park:** TAMBA and state park crews worked together to build a new trail. TAMBA has more major trail projects happening all around Lake Tahoe this season. A combination of paid crews and community volunteers are building the collective vision of connecting all communities to the trails.

2018 projects will include a new trail near Mount Rose and Tamarack Lake, improvements to the Kingsbury Stinger Trail, new trails near Fallen Leaf Lake and Angora Ridge, improvements to the Stanford Rock Trail, and a multi-use trail near Kings Beach.

For more information and to get involved, visit TAMBA.org.

Amy Fish is a TAMBA board member.

Treating Tahoe's West Shore trees

After 5 years of drought, forests face high risk of wildfire

By Christina Restaino

TAHOE REGIONAL PLANNING AGENCY

Last winter marked one of the most severe flu seasons in recent memory. Thousands of people were hospitalized and many died. People with compromised immune systems such as the elderly or young children were hit particularly hard with the flu.

Lake Tahoe's forests are no different.

Just as humans are susceptible to the flu when our immune systems are delicate, forests are more susceptible to pest infestations and other plights when trees' immune systems are weakened by drought. Tahoe forests were clear-cut during the 1800s Comstock mining era. As a result, fire suppression and lack of management allowed these forests to become overly dense, making them even more vulnerable to fire, insects, and disease.

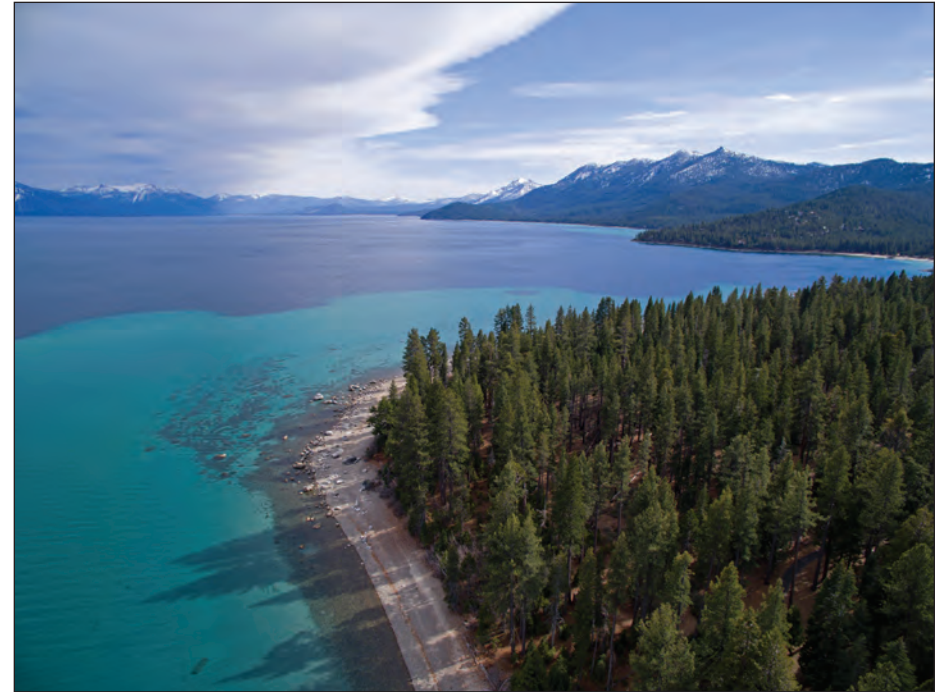
Lake Tahoe agencies have been working to combat this challenge for 15 years.

Since the Angora Wildfire of 2007, agencies have treated more than 50,000 acres for hazardous fuels reduction. The largest project covered approximately 10,000 acres to reduce the fire risk in the wildland urban interface where the forest connects to neighborhoods. But there is more work to do, and resource managers at Tahoe are committed to restoring the health of forests throughout the basin.

After five years of extreme drought, the West Shore is at particularly high risk of a high-intensity wildfire. A new approach has emerged to tackle this challenge and to target treatment of 60,000 acres from the lakeshore to the upper forest.

The Lake Tahoe West Restoration Partnership is working to improve the health of our forests in an area at high risk for wildfire. Multiple agencies and stakeholder partners are collaborating on how to boost the immune system of our forests. It started with an overall assessment of general forest health and resilience. The group is studying what optimal health looks like—how dense the forest should be, what healthy wildlife habitats look like, and what tree species are best suited for our forest.

Next, the group identified how far the West Shore forest is from optimal health. Out of this process emerged the Landscape Resilience Assessment—a



Photos: Drone Promotions
The Lake Tahoe West Restoration Partnership is focused on 60,000 acres of land from the lakeshore to the upper forest, including the area of the West Shore (lower left photo) where the Emerald Fire burned in 2016.

comprehensive look at the values and services we derive from our forests and how far afield these are from desired conditions.

The Landscape Resilience Assessment found that a majority of the West Shore forest is at risk of high-intensity wildfire or beetle mortality, which usually follows drought. The assessment identified where the least-healthy, least-resilient areas are for forest density, wildlife, and fire risk. The partnership can now use this information to help target areas for improved resource management.

The Lake Tahoe West group is also working on a Landscape Restoration Strategy to outline and communicate the why and how of forest restoration goals and activities. Strategy development is occurring alongside a detailed, science-based modeling initiative to understand how different forest treatments affect attributes like fire risk, wildlife habitat, air quality, and water quality. This

modeling work is considering landscape-level dynamics and will help the group sketch out solutions that match the scale of the problem. Partners will complete the Landscape Restoration Strategy in the fall of 2018 and project-scale planning will begin.

Lake Tahoe West has involved stakeholders and helped land management agencies partner with communities to find solutions to our most pressing problems. This collaboration will help forest managers create more resilient forests while improving recreation, wildlife habitat, and scenic quality. For more information, visit <https://www.nationalforests.org/who-we-are/regional-offices/california-program/laketahoewest>.

Christina Restaino, Ph.D., is the forest ecosystem health program manager for the Tahoe Regional Planning Agency and leads the Interagency Design Team for Lake Tahoe West.

Safer in Skyland

Community leaders, new program improving wildfire preparedness at Tahoe

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

Creating a fire-adapted community takes a neighborhood working together. But it sure helps to have someone like Ann Grant to get things going.

"Every neighborhood needs an Ann," said Lisa Herron, spokeswoman for the U.S. Forest Service Lake Tahoe Basin Management Unit.

Finding, training, and organizing volunteers like Ann Grant for every neighborhood at Lake Tahoe is the focus of a new Tahoe Network of Fire Adapted Communities program being run by the Tahoe Resource Conservation District.

When Grant first moved to Skyland, Nevada from urban Orange County, California in 1990, she didn't know much of anything about wildfires or how to live responsibly in a rural, fire-prone landscape like Tahoe. Grant and her neighbors in Skyland had much to learn, and much more to do.

The East Shore neighborhood of 245 homes had an abundance of highly-flammable ornamental juniper shrubs in people's yards. The natural vegetation was thick and overgrown and homes had no defensible space. The neighborhood's original building standards a half-century earlier had required people to build homes with wood-shake roofs, which are flammable and prone to ignite from falling embers from nearby fires.

"I knew nothing about forestry or wildfire and I didn't have a concern either," Grant said. "I had bitterbrush and manzanita covering the yard and running right up to the house and under the deck. My house was destined to burn in the next wildfire."

Fortunately, Grant wised up before that next fire ever came. She was volunteering in a local election in the early 2000s and overheard other volunteers talking about efforts to improve wildfire preparedness. She joined the conversation and soon after volunteered with the now-defunct Nevada Fire Safe Council.

Learning about wildfire risk and steps homeowners and neighborhoods can take to reduce it, Grant quickly cleaned up her property by removing trees, branches, and brush as needed to create defensible space to help keep a wildfire from spreading to her home or from the



Photo: Tom Lotshaw, Tahoe Regional Planning Agency

After learning how to defend her own home from wildfire, Ann Grant worked to help her neighbors prepare.

ground up into the tree canopy.

Grant became the neighborhood leader for wildfire preparedness in Skyland, working with Tahoe Douglas Fire Protection District and other public agencies to share information with her neighbors about how to reduce wildfire risk.

Grant secured grant funding and organized volunteers to help Skyland homeowners clear brush and create defensible space. She worked with the sheriff's office and fire district to organize an evacuation drill, encouraging neighbors to keep an evacuation kit ready and to sign up for emergency notifications through the county's reverse 911 system.

Grant helped organize a group-bid with local contractors for neighbors to replace their old wood-shake roofs with fire-resistant roofing materials at a discount price. She also worked with the U.S. Forest Service to thin forests and clear brush from National Forest land adjacent to Skyland, creating a fire break for the neighborhood.

Today, all but two of the junipers are gone, and the two remaining have been trimmed and maintained to reduce their fire risk. There are only about 10 wood-shake roofs left in Skyland and about 98 percent of the residents have created defensible space for their homes.

Grant continues to talk with her neighbors and all new residents in Skyland about the importance of creating

and maintaining defensible space on their properties and being ready for wildfire.

"On a windy day, if several wildfires started in the Tahoe Basin, there would not be enough resources available. People need to be responsible for their property. That personal responsibility is so important because what you do on your property affects the entire community," Grant said.

"If we could just have one person in each neighborhood around the basin organizing this kind of work, the basin would be so much safer."

That's the focus of the new Tahoe Network of Fire Adapted Communities program. Grant is an ambassador for the program, sharing her experience with other neighborhoods around Tahoe.

Agencies have spent two decades thinning forests and reducing hazardous fuels on Tahoe's public lands, treating more than 70,000 acres. But residents and neighborhoods play an equally important role in reducing catastrophic wildfire risk.

Tahoe Network of Fire Adapted Communities helps neighborhood volunteers organize and work with the local fire district and state and federal agencies to create fire adapted communities like Skyland.

Through the program, fire districts are identifying the most at-risk communities and working to increase partnership, outreach, education, and activities to help residents create defensible space,

improve the ember-resistance of their homes, and prepare for Tahoe's next wildfire.

"We're focused on trying to make wildfire preparedness and community protection as straight forward and easy as possible. It really is about education and connecting people to resources to get what they need done to make our homes and neighborhoods safer," said program coordinator Carlie Teague.

"We all understand wildfires can happen anywhere, and we're learning they can happen at almost any time. This program is designed to help communities prepare, to give ourselves the best chance to protect life and property when we do have a wildfire."

Volunteers are being sought around the lake. Learn more about how to get involved at www.tahoe.livingwithfire.info/fire-adapted-communities/.

Five steps you can take today to prepare for wildfire

Access: Ensure your home can be accessed by emergency responders during a fire by making sure address and street signs are visible and gated driveways can be accessed.

Built environment: Use fire-resistant or noncombustible roofing, siding, decking, trim, and fencing materials. Check for flying ember vulnerabilities and remove debris from gutters, roofs, vents, and chimneys.

Defensible space: Contact your local fire district for a free defensible space evaluation and ask about free chipping services.

Community protection: Talk to your neighbors about wildfire preparedness and encourage them to get a defensible space evaluation. Contact Carlie Teague, cteague@tahoercd.org, to become a fire adapted community leader in your neighborhood.

Evacuation: Sign up for emergency notifications, make an evacuation supply kit and family emergency plan, and practice preparing your home, family, and guests for an evacuation.



Photo: Novus Select

A surfer enjoys a ride on the wake of a motorized watercraft on Lake Tahoe.

Boat inspections play key role in keeping invaders out of Lake Tahoe

Continued from page 3

through the inspection stations, their tone is much different than it was in 2007. They get it and have been conditioned to be wary of aquatic invasive species. They want to do the right thing when they come to Lake Tahoe."

What are aquatic invasive species?

Aquatic species like weeds, nonnative fish, mussels, clams, and other invertebrates can threaten native ecosystems and ruin a resource's natural beauty and recreation potential. They can cloud the water, foul beaches, and push out native species, causing massive changes to the appearance and quality of a lake or other natural resource.

Aquatic invasive species currently in Lake Tahoe include Eurasian watermilfoil, curlyleaf pondweed, largemouth bass, Asian clams, bluegills, bull frogs, and goldfish. Some of these invaders were introduced by people who either set loose living fish or dumped their aquariums.

Some, such as the nonindigenous Eurasian watermilfoil, were likely introduced over 30 years ago. Mysis shrimp were purposely introduced over 50 years ago, while others, such as the largemouth bass and Asian clams, are fairly recent arrivals. The fish have taken

advantage of warmer water and the invasive weeds to make a home in certain areas of Lake Tahoe, such as the Tahoe Keys.

A measure of success

Since the boat inspections began, no new invasive species have been found in the lake. This hasn't been the result of luck, but of hard work. In 2016 alone, the conservation district conducted 6,800 inspections and required 2,300 decontaminations. Forty vessels that year carried some form of invasive species. Had it not been for the inspections, and TRPA's lakewide jurisdiction to oversee the program, these contaminated boats would have entered Lake Tahoe.

The inspections, which take place at four entry points to the Lake Tahoe Region, allow trained and certified employees to examine all areas of the boat including the hull, engine, live well, bilge, and trailer. If anything looks suspicious, the boat is decontaminated with 140-degree water before it can be launched. Annual inspection fees range from \$35 for personal watercraft to \$101 for vessels over 39 feet. A decontamination, if necessary, is \$35.

All boaters should arrive "Clean, Drain, and Dry," meaning all vegetation, mud, sand, and other contaminants

should be cleaned off surfaces; all bilge, ballast, live wells, and sea strainers should be drained; and all compartments of a boat should be dry. Water present in a compartment or engine results in a decontamination.

"TRPA had a challenge in the beginning to either close the lake to outside boating or figure out a way to keep our waters public," Cartwright said. "The question was, 'How far are we willing to go and how much money are we willing to spend to keep the lake open and free of invasives?'"

"Now all the access points have gates and hours. All boats that come in with water get decontaminated. Not many places have that level of protection."

Greatest accomplishment

Cartwright and Zabaglo are quick to point out how many agencies have pulled together in the Tahoe Basin to battle aquatic invasive species. The Lake Tahoe Aquatic Invasive Species and Watercraft Inspection Programs are implemented by 40 public and private partner organizations, including federal, state and local jurisdictions, research partners, public utility districts, and private marinas. The Tahoe Regional Planning Agency and the Tahoe Resource Conservation District

lead the inspection program through the collaborative framework of the Lake Tahoe Aquatic Invasive Species Coordinating Committee. The Committee provides the leadership, direction, and resources to fulfill this program's mission of prevention, detection, and control of aquatic invasive species in the Lake Tahoe Region.

The committee's research, including work from the University of Nevada, Reno, and the U.C. Davis Tahoe Environmental Research Center, has mixed science, management, technology, and regulation to create a multi-pronged strategy to prevent and remove aquatic invasive species from Tahoe.

"That's where our success starts," Cartwright said. "We've been able to bring all these minds together to tackle this problem and the result has been a nationally recognized program that is the most robust in the United States."

Zabaglo echoes that.

"Our greatest accomplishment has been the massive support we've had in the last 10 years," he said. "We've had buy-in from the marinas, the boating public, legislators, and funders, and that's really what's helped our program be successful."

Bike advocates lead the way in Lake Spirit awards

Honor goes to North and South Shore residents committed to helping Tahoe

By Adam Jensen

TAHOE REGIONAL PLANNING AGENCY

The Tahoe Regional Planning Agency has honored four people for their commitment to protecting Lake Tahoe.

Bike advocates led the way in this year's Lake Spirit Award nominations, with bike safety, multi-use paths, and bike trails all among the interests of the winners.

Awards are given to people from both the North and South shores who are either citizens, agency representatives, or environmental scientists. This year's winners are:

South Shore Citizen: Gavin Feiger

Gavin Feiger is a passionate bicycle advocate who has shared his love of pedaling by doing everything from teaching elementary school students bike safety and analyzing existing bike parking to writing grants to get more bike racks.



Feiger

"Gavin Feiger is an exemplary Tahoe citizen, not only in his work in the watershed and environmental conservation industry but also in his volunteer efforts as an active member and leader of the Lake Tahoe Bicycle Coalition and the Community Tahoe Mobility Group," wrote South Shore's

Gianna Leavers in nominating Feiger.

"He is an excellent candidate for a Lake Spirit Award because he not only strives to protect the Lake Tahoe environment in so many ways, but he always does it with a smile on his face and encourages others to do the same through his good nature and great attitude."

North Shore Citizen: Sue Hughes

Another Lake Tahoe trail advocate, Sue Hughes, was instrumental in the restoration of the Incline Flume Trail.



Hughes

"Sue Hughes is a perfect example of what one citizen can accomplish for Tahoe when they tirelessly dedicate themselves to a project," said Tahoe Fund CEO Amy Berry in nominating Hughes. "Sue is the president of Friends of Incline Trails. In this role, she has led the efforts to restore the historic Incline Flume Trail. A family-friendly trail used by many, she saw that it was in need of trail work and signage to make it more environmentally sound and safe for users. And fun for mountain bikers!"

Berry added, "Through a lot of hard work, sweat, and dusty clothes, Sue has made this project a reality. The community owes Sue a debt of gratitude and more than a couple of cold beers.

Thanks to her, we will have an improved 9-mile trail for all user types to enjoy the wonder of Tahoe."

South Shore Agency Representative/ Environmental Scientist: Jacob Quinn

If you've enjoyed any of the recent additions to mountain bike trails at Lake Tahoe's South Shore, it's likely Jacob Quinn had a part in your ride.



Quinn

"Jacob Quinn has gone above and beyond his job duties with the U.S. Forest Service to help build more sustainable, multi-use trails in the Lake Tahoe Basin, including Corral, Star Lake, Tahoe Rim Trail, Monument, Tahoe Mountain, Angora, and beyond," said Amy Fish, board member with the Tahoe Area Mountain Biking Association.

"His work has resulted in more recreational opportunities at Lake Tahoe, while helping to preserve the natural beauty of the region. Jacob not only gets things done, he comes up with creative ways to engage volunteers. He's a master trail builder that brings the community into the process."

North Shore Agency Representative/ Environmental Scientist: Amy Berry

As the CEO of the Tahoe Fund, a nonprofit organization dedicated to

building broad support and funding to restore and enhance Lake Tahoe's natural environment, Amy Berry has helped raise more than \$6 million from private donors, including more than \$1 million for a new section of the Lake Tahoe Bikeway from Incline Village to Sand Harbor.



Berry

The Tahoe Fund's portfolio includes high-priority Environmental Improvement Program projects.

These projects include critical watershed restoration, new sections of the Lake Tahoe Bikeway, and removal of aquatic invasive species.

"Amy Berry defines the person who has leadership skills to infuse the spirit of Lake Tahoe in anyone she meets," said North Shore's Holly Racich.

"Not only is her life passion to experience Lake Tahoe at its fullest, but it is her dream to preserve and enhance the great gifts Lake Tahoe has to offer. As the CEO of Tahoe Fund, she has the experiences and perspectives on the approach and qualities necessary for effective leadership.

"She empowers not only her donors to want to be involved, but she also brilliantly collaborates with government officials to succeed together."

Tahoe Keys property owners testing new ways to keep weed fragments from entering lake

Continued from page 10

The neighborhood is testing a "bubble curtain" between its lagoons and Lake Tahoe to see if it can keep weed fragments from spreading into the lake. It wants to test laminar flow technologies in 7 to 8 acres of the canals and lagoons to see if increased oxygenation of the water can help stop the recurrence of aquatic invasive plants and reduce conditions that promote their growth.

Among the treatment options, there are no easy solutions in the Keys. In response, TKPOA, TRPA, and Lahontan are working to launch a broad collaborative process and environmental analysis to review the Tahoe Keys management plan—including one of its most controversial aspects, a TKPOA



"The Tahoe Keys is showing real leadership in working to address the invasive species in its waters."

Dennis Zabaglo

Tahoe Regional Planning Agency

proposal to test the use of aquatic herbicides in a portion of its canals and lagoons as one way to knock down the populations of invasive plants.

The federally approved herbicides are just one aspect of the Tahoe Keys multi-faceted management plan and would be used only temporarily and in conjunction with other control methods. Under the proposal, the herbicides would

be used in the most infested areas to reduce the population to a level that can be controlled through other methods. The herbicides are used in other lakes across the country to selectively target invasive species like Eurasian watermilfoil and curlyleaf pondweed, but have never been used in Lake Tahoe or any other federally designated Outstanding National Resource Water with the highest level of

protection, as is the case with Lake Tahoe.

The proposal has raised concern among some residents and groups like the Tahoe Water Suppliers Association.

"The Tahoe Keys is showing real leadership in working to address the invasive species in its waters," said Dennis Zabaglo, aquatic resources program manager for TRPA.

"Working together to find an acceptable collaborative solution for the Keys is the most important opportunity we have to control far more serious spread and infestation lake wide. Success is our only option and working together is the path to success," said Joanne S. Marchetta, executive director at TRPA.

To learn more: keysweedsmanagement.org.

Become a Tahoe In Depth subscriber or supporter

We hope you’ve enjoyed this edition of *Tahoe In Depth*. **You can help keep the paper coming!** Consider becoming a subscriber to *Tahoe In Depth* so that you and others can continue to receive ideas on “Protecting, Enjoying & Exploring the Lake Tahoe Basin” in your mailbox.

All subscribers are entered in a drawing to win a \$100 gift certificate from a local nursery for a native tree. Just cut out and mail in the subscriber form and your check made out to the Tahoe Regional Planning Agency or subscribe online at tahoeindepth.org.

And please send us your feedback or story requests to tahoeindepth@gmail.com — we love to hear from our readers.

YES! I want to become a subscriber to *Tahoe In Depth* and continue “Protecting, Enjoying & Exploring the Lake Tahoe Basin.” Please find enclosed my check for

Subscriber Levels:

☐ \$1 - \$99 Friend

☐ \$100 - \$249 Supporter

☐ \$250 - \$499 Benefactor

☐ \$500 - \$999 Advocate

☐ \$1,000 - \$2,499 Champion

☐ \$2,500 and up Philanthropist

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: _____

Email: _____

Mail to: Tahoe In Depth, PO Box 5310,
Stateline, NV 89449

Enter our drawing!

For every issue of Tahoe In Depth, all subscribers are entered to win a \$100 gift certificate from a local nursery for a native tree.

This issue’s winner

Congratulations to:
\$100 gift certificate winner: Charles Ward,
South Lake Tahoe, CA

Thank You

Tahoe In Depth is made possible by the generous support of subscribers and underwriters. From the entire team at *Tahoe In Depth*, thank you for contributing to the publication.



What readers are saying:

I just want to say “thank you” for the newspaper. I have a cabin in Tahoma. Unfortunately I’m not able to drive up there any more due to old age. The magazine keeps me connected and is more than welcome. — R.G.





Save time, save paper: *Subscribe online at tahoeindepth.org*

Readers who have subscribed to Tahoe In Depth since our last issue:

- | | | | | |
|-------------------------|------------------|--------------------|--------------------|---------------------------------|
| Robert Felton | Barb Fry | Ronald P. Tomsic | Linda Petrakis | Lari Sheehan c/o Kelli Benedict |
| Judson Riggs | Jennifer Borwick | Marty Oberlander | Anna Maria Oniciu | Ken Fisher |
| Douglas Swager | Jim Backhus | Catherine C. Lyman | Greg Vorreyer | Paul and Angela Morway |
| Rachel Karklin | Leslie Ward | Don Dobbs | Mr Michael Luckoff | Joe Sidoti |
| Mickey and Tracey Noack | Charles Ward | Tom Pillar | Greg Culver | |
| Carol Guarnaccia | Jeff Stricker | Paul O-Rear | Al Reynolds | |
| Lois Campbell | Ellen Crumb | Walter Mirczak | Tom Reviglio | |

3 steps closer to fun

✓ CLEAN ✓ DRAIN ✓ DRY

10 years
fighting invasive species

Take three steps closer to fun—Clean, Drain, and Dry watercraft before arriving at a Lake Tahoe inspection station. A friendly, certified inspector will ensure your boat is free of aquatic invasive species and get you and your family on the water.

Lake Tahoe is a national treasure. Help protect it.

TahoeBoatInspections.com
888-824-6267



Break out the binoculars



Photo: Will Richardson, Tahoe Institute of Natural Science

Birdwatchers gather near the Tahoe shoreline to identify birds as part of the Tahoe Institute of Natural Science's "Tahoe Big Year."

It's shaping up to be a 'Big Year' as birdwatchers in the Tahoe Basin keep their eyes on the skies

By Will Richardson

TAHOE INSTITUTE OF NATURAL SCIENCE

Tahoe Institute of Natural Science (TINS) is hosting the "Tahoe Big Year" in 2018. In birding parlance, a "big year" is an attempt to identify as many species as possible during a calendar year and within some geographical boundary. The vast majority of big years have focused on birds, though a few have focused on other groups of plants and animals (e.g., big years for butterflies are gaining popularity). Birding big years are regularly attempted for the United States, individual U.S. states, Canadian Provinces, and even counties.

Big year history

TINS hosted Tahoe's first Big Year in 2015. The tradition dates back to the late 1930s, shortly after the publication of Roger Tory Peterson's first field guide. In 1939, Guy Emerson, a traveling businessman who timed his trips to coincide with the best birding opportunities around the country, set the bar with 497 species. This record was bested 13 years later, and before long an impressive series of big year attempts (followed by terrific books highlighting the work) was underway. The time, energy, and commitment required for these continent-wide big years are considerable. In recent years, a few ambitious birders have attempted World Big Years, and in 2016, Arjan Dwarshuis of the Netherlands tallied a staggering 6,833 species while traveling the globe.

The goals for the Tahoe Big Year are more modest and varied. Big years are



inherently competitive, so they motivate people to go birding more often, explore parts of Tahoe they never visit, and sneak in a quick visit to their favorite birding spot before work. Organizers encourage participation among birders of all levels and ages. The goal is to uncover new birding sites, reveal migration and distribution patterns, expand and promote the community of birders and nature enthusiasts in the region, and generate excitement about birding at Tahoe. Toward these goals, the Tahoe Big Years are succeeding on all fronts.

Setting the location boundaries for the Big Year was challenging. TINS wanted to include Truckee but not make the area unmanageably large. After all, these are "Tahoe" big years, and the six counties that converge on Lake Tahoe extend far into "un-Tahoe" portions of California and Nevada. For the 2018 Tahoe Big Year, the boundaries include the Lake Tahoe Basin and the Truckee River watershed that falls within California.



Photos: Will Richardson, Tahoe Institute of Natural Science

Birders, above, scan the skies along the Tahoe shoreline. At left, a soaring peregrine falcon.

Participants can log each new species on tahoebigyear.org. Participants can also share photos and sightings, and discuss difficult identification questions in a Facebook group.

How to participate

This event is more than a competition but an opportunity for the entire community to learn about and experience the Tahoe Region's diverse bird community and rich birding opportunities. The website, tahoebigyear.org, highlights monthly target birds and weekly birding tips. Monthly birding outings are designed to help participants tally new species and expose them to productive birding areas. These outings have been popular, and countless species have been added to participants' lists (and quite a few to life-lists as well). A bonus for participants who are TINS members includes randomly awarded monthly prizes and prizes to the top-three final tallies in both youth and adult categories.

At the end of 2015, the cumulative Tahoe Big Year species list stood at a

remarkable 243 species. Rarities included the long-tailed duck (*Clangula hyemalis*), American redstart (*Setophaga ruticilla*), Lesser Black-backed Gull (*Larus fuscus*), Placer County's first American Tree Sparrow (*Spizelloides arborea*), Harris' Sparrow (*Zonotrichia querula*), Mountain Plover (*Charadrius montanus*), Rusty Blackbird (*Euphagus carolinus*), and Hooded Oriole (*Icterus cucullatus*).

The high lake level has meant less shorebird habitat and a slower start for 2018. However, many rarities have already been found, and there is no telling what is in store for the remainder of the year. If you would like to get involved in the 2018 Tahoe Big Year, there is plenty of time to catch up. The bird species found in Tahoe from July through December mirror those of the first half of the year, with spring passage migrants returning on their southbound travels in the fall, and winter birds present at either end of the calendar year. For more information, visit tahoebigyear.org.

Will Richardson is the executive director of the Tahoe Institute of Natural Science.